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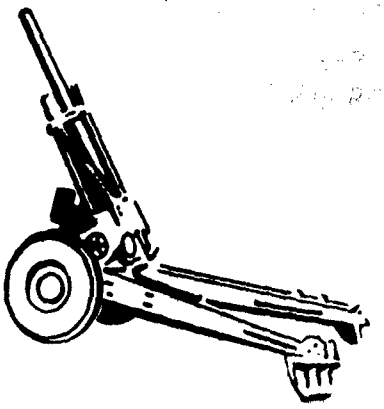

INTERIM NOTE

NO. G-62-A

AMSWAG USERS MANUAL

ROBERT D. ORLOV

JUNE 1979

U. S. ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY
ABERDEEN PROVING GROUND, MARYLAND

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US ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY
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G R O U N D W A R F A R E D I V I S I O N

INTERIM NOTE NO. G-62-A

RDOrlov/bk
Aberdeen Proving Ground, MD
June 1979

ABSTRACT

A user manual for the AMSAA War Game (AMSWAG) computer combat main model is provided. The order, content, and format of the input cards necessary to run a case are described. Also, the primary output of the model is described.

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AMSWAG USERS MANUAL

1. INTRODUCTION

The purpose of this report is to provide a user manual of the AMSAA War Game (AMSWAG) computer combat main model. The main model is a time-sequenced, deterministic, battalion level, force-on-force computer model that simulates a typical attack/defense.

This report is specifically intended to provide a user with the necessary information to correctly prepare the input cards to the main model and to understand the primary output from the model. It is also intended to provide analysts and/or managers with additional appreciation for the capabilities and limitations of AMSWAG.

The report is divided into three sections: order of input cards, content and format of input cards, and output.

It is important to realize that this user manual is only for the main model. The preprocessor programs which prepare the input for the main model are not covered in this report.

2. ORDER OF INPUT CARDS TO AMSWAG

The order of the input cards to AMSWAG, with some noted exceptions, is immaterial. These exceptions are: the identification (ID) card is the first card, the begin game (GAME) card is the last card, and cards (including the TABF card) which contain references to weapon and/or round codes must follow the weapon (WPN) and squad (SQBA, SQBD, SQDA, SQDD, SQEA, SQED, SQUN) cards.

A sample ordering of a typical input stream of cards is given beginning on the next page (Table 2.1).

TABLE 2.1 SAMPLE INPUT STREAM

```
ID    ENG STUDY MINES78   RA                    CURRENT TIME FRAME
UNIT  28 101 123
UNTA  1500101 1 102 1 103 1 104 1 105 1
UNTA  7300108 1 109 1 110 1 111 1
UNTA  8310112 1 113 1 114 1 115 1 116 1 117 1
UNTA  1350  1 1   2 2   4 1   6 1   8 2   9 2  10 2  11 2  13 1  14 2   16 2
UNTA  1350 17 2  19 2  20 2  22 2
UNTA  3350  3 1   5 1   7 1  12 2  15 1  18 1  21 1  23 1  24 1
SQUN  8350  3 1   5 1   7 1  12 1  15 1  18 1  21 1  23 1  24 1
UNTA  6060
WPN   15001D301D20  91019102910391O7  9D329D349D339307  9D329D349D339D29  0011 2
WPN   73007E007E00  9701              9E08             9E38              0    2
WPN   13501D601D50  91519152915391S7  9D619D629D639E93  9D619D529D539D90  0011 2
WPN   33503D503D50  93519352935393S7  959095539D819594  9D809D849D819D90  0101 1
WPN   60603D503D60  9660              9394             9D90              1    2
SQDD  831083108E10
SQED  2310          92109201          9A139301         9E099E12          01
SQED  5310          95109501          95479301         95479E12          01
SQED  5320          95209502          93029301         9E079E12          11
SQED  5330          9530              9303             9E11              1
SQED  5340          9540              9300             9400              1
SQBD  2310   1.0     1
SQBD  5310   3.0     5
SQBD  5320   2.0     4
SQBD  5330   1.0     2
SQBD  5340   2.0     3
SQDA  835083508D50
SQEA  5350          9550              9397             9D91              0
SQEA  5360          9560              9399             9399              1
SQEA  5370          9570              9398             9398              1
SQBA  5350   1.0     2
SQBA  5360   5.0     3
SQBA  5370   2.0     1
LOAD  1500  9101   30.  9102   15.  9103    5.  9107 5950.
LOAD  7300  9701   20.
LOAD  8310
LOAD  2310  9210    6.  9201  420.
LOAD  5310  9510    2.  9501  420.
LOAD  5320  9520   34.  9502  420.
LOAD  5330  9530  900.
LOAD  5340  9540 1000.
LOAD  1350  9151   13.  9152    6.  9153   21.  9157 2500.
LOAD  3350  9351   30.  9352   10.  9357 2000.  9353    4.
LOAD  6060  9660 2000.
LOAD  8350
LOAD  5350  9550    5.
LOAD  5360  9560  120.
LOAD  5370  9570  250.
TGTP1350  1500250-10  7300240-10  8310151-50
TGTP3350  1500205-05  7300203-05  8310250-50
TGTP6060  1500 50-10  7300250-10  8310200-20
TGTP5350  1500250-10  7300170-10  8310130-10
TGTP5360  8310250-10
TGTP5370  8310250-10
TGTP1500  1350250-10  3350240-04  6060245-10  8350245-10
TGTP7300  1350250-10  3350240-04  6060240-04
TGTP2310  1350250-10  3350170-10  6060170-10  8350130-10
TGTP5310  1350 90-10  3350130-10  6060130-10  8350250-10
TGTP5320  1350 90-10  3350130-10  6060130-10  8350250-10
TGTP5330  8350250-10
TGTP5340  8350250-10
EXCP  1500  1350  8101  9101  9102  9102
EXCP  1500  3350  9102  9101  9101  9102
```

```
EXCP  1500  6060  9102  9102  9101  9102
EXCP  1500  8350  9107  9103  9103  9102          1000.
EXCP  7300  1350  9701  9701
EXCP  7300  3350  9701  9701
EXCP  7300  6060  9701  9701
EXCP  2310  1350  9210  9210
EXCP  2310  3350
EXCP  2310  6060  9210  9210
EXCP  2310  8350  9201  9201
EXCP  5310  1350  9510  9510
EXCP  5310  3350  9510  9510
EXCP  5310  6060  9510  9510
EXCP  5310  8350  9501  9510  9510  9501          150.
EXCP  5320  1350  9520  9520
EXCP  5320  3350  9520  9520
EXCP  5320  6060  9520  9520
EXCP  5320  8350  9502  9520  9520  9502          150.
EXCP  5330  8350  9530  9530
EXCP  5340  8350  9540  9540
EXCP  1350  1500  9151  9151  9152  9152
EXCP  1350  7300  9151  9151  9152  9152
EXCP  1350  8310  9157  9153  9153  9157          1000.
EXCP  3350  1500  9351  9353  9353  9353           800.
EXCP  3350  7300  9351  9353  9353  9353           800.
EXCP  3350  8310  9357  9352  9352  9357           300.
EXCP  5350  1500  9550  9550
EXCP  5350  7300  9550  9550
EXCP  5350  8310  9550  9550
EXCP  5360  8310  9560  9560
EXCP  5370  8310  9570  9570
EXCV  9151  7300  9D51  7E40
EXCV  9352  8310  9353  8310
EXCV  9153  8310  9B52  8310
EXCV  9101  1350  9D22  1D50
EXCV  9101  3350  9D28  3D50
EXCV  9101  6060  9D22  6D50
EXCV  9102  1350  9D24  1D50
EXCV  9102  3350  9D24  3D50
EXCV  9102  6060  9D24  6D50
EXCV  9102  8350  9334  8350
EXCV  9103  8350  9B02  8350
EXCV  9510  1350  9347  1B51
EXCV  9510  6060  9347  3351
EXCV  9510  3350  9347  3351
EXCV  9510  8350  9347  8350
EXCV  9520  1350  9402  1350
EXCV  9520  3350  9402  3351
EXCV  9520  8350  9402  8350
EXCV  9520  6060  9402  3351
EXCV  9540  8350  9400  8350
EXCV  9550  8310  9397  8310
EXCV  9560  8310  9399  8310
EXCV  9570  8310  9398  8310
EXCV  9660  1500  9603  1350
EXCV  9660  7300  9603  1350
DISW  3350
GFAC   1.5
DX09101    0    0    0    0    0    0    0
DXH9101    0    0    0    0    0    0    0
DXM9101    0    0    0    0    0    0    0
MX09101    0   -1   -2   -3   -5   -6   -7
MX19101   -4  -16  -37  -59  -82 -106 -129
MX29101   11   -8  -32  -55  -78 -102 -127
MX39101   38    4  -26  -50  -74  -98 -123
MX49101   78   22  -17  -44  -69  -93 -119
DY09101    0    0    0    0    0    0    0
DYH9101    0    0    0    0    0    0    0
DYM9101    0    0    0    0    0    0    0
MY09101    1    1    1    1    1    1    1
MY19101    3    3    3    4    4    4    5
MY29101    6    6    7    7    8    9    9
MY39101   10    9   10   11   12   13   14
MY49101   13   12   13   14   16   17   19
```

DX09103	0	0	0	0	0	0	0
DXH9103	0	0	0	0	0	0	0
DXM9103	0	0	0	0	0	0	0
MX09103	-2	-5	-12	-23	-37	-57	-80
MX19103	-32	-86	-217	-381	-544	-369	-310
MX29103	-3	-70	-206	-388	-632	-926	-1224
MX39103	50	-46	-192	-377	-629	-956	-1340
MX49103	130	-10	-175	-365	-619	-954	-1360
DY09103	0	0	0	0	0	0	0
DYH9103	0	0	0	0	0	0	0
DYM9103	0	0	0	0	0	0	0
MY09103	3	3	5	7	10	15	21
MY19103	15	16	23	34	51	75	106
MY29103	30	32	46	68	101	149	210
MY39103	46	48	69	101	150	221	313
MY49103	63	64	91	134	199	292	413
DX09102	0	0	0	0	0	0	0
DXH9102	0	0	0	0	0	0	0
DXM9102	0	0	0	0	0	0	0
MX09102	-1	-2	-4	-8	-12	-19	-28
MX19102	-9	-29	-76	-136	-214	-306	-397
MX29102	10	-19	-69	-130	-215	-326	-477
MX39102	44	-3	-62	-123	-206	-321	-478
MX49102	96	21	-51	-115	-200	-215	-474
DY09102	0	0	0	0	0	0	0
DYH9102	0	0	0	0	0	0	0
DYM9102	0	0	0	0	0	0	0
MY09102	1	1	1	2	3	4	6
MY19102	6	6	7	10	14	20	30
MY29102	11	11	15	20	28	40	59
MY39102	17	17	22	30	41	59	88
MY49102	23	23	30	40	55	78	116
DX09151	107	36	0	-12	-18	-21	-24
DXH9151	0	0	0	0	0	0	0
DXM9151	0	0	0	0	0	0	0
MX09151	0	-1	-2	-3	-4	-6	-7
MX19151	-8	-18	-36	-57	-79	-102	-124
MX29151	-8	-17	-35	-55	-76	-100	-123
MX39151	-8	-17	-35	-54	-75	-98	-121
MX49151	-8	-17	-35	-54	-74	-97	-119
DY09151	0	0	0	0	0	0	0
DYH9151	0	0	0	0	0	0	0
DYM9151	0	0	0	0	0	0	0
MY09151	0	0	0	0	0	0	0
MY19151	0	0	0	0	0	0	0
MY29151	0	0	0	0	0	0	0
MY39151	0	0	0	0	0	0	0
MY49151	0	0	0	0	0	0	0
DX09152	107	36	0	-12	-18	-21	-24
DXH9152	0	0	0	0	0	0	0
DXM9152	0	0	0	0	0	0	0
MX09152	-1	-3	-7	-14	-23	-39	-60
MX19152	-24	-54	-132	-243	-382	-519	-305
MX29152	-23	-52	-128	-241	-407	-649	-971
MX39152	-23	-52	-126	-237	-402	-653	-1025
MX49152	-23	-51	-125	-234	-396	-647	-1027
DY09152	0	0	0	0	0	0	0
DYH9152	0	0	0	0	0	0	0
DYM9152	0	0	0	0	0	0	0
MY09152	0	0	0	0	0	0	0
MY19152	0	0	0	0	0	0	0
MY29152	0	0	0	0	0	0	0
MY39152	0	0	0	0	0	0	0
MY49152	0	0	0	0	0	0	0
DX09153	107	36	0	-12	-18	-21	-24
DXH9153	0	0	0	0	0	0	0
DXM9153	0	0	0	0	0	0	0
MX09153	-2	-4	-8	-14	-21	-29	-38
MX19153	-31	-68	-152	-247	-345	-430	-481
MX29153	-30	-66	-147	-246	-362	-496	-644
MX39153	-30	-66	-145	-241	-356	-495	-655
MX49153	-30	-65	-143	-238	-351	-489	-651

```
KILL  1350  MOF
KILL  3350  F     M     M/F     EC
KILL  6060  MOF
KILL  8350  P
KILL  1500  F
KILL  7300  F
KILL  8310  P
KILL  2310  P
PERS  1350    40
PERS  3350    30
PERS  6060    40
PERS  8350    80
PERS  1500    40
PERS  7300    40
PERS  8310    90
SUPP  1500   .1      10.
SUPP  7300   .3      10.
SUPP  8310   .9      15.
SUPP  1350   .1      10.
SUPP  3350   .3      10.
SUPP  6060   .3      10.
SUPP  8350   .9      20.
PPBS  9501  10.
PPBS  9502  10.
PPBS  9530  10.
PPBS  9540  10.
PPBS  9560  10.
PPBS  9570  10.
PPBS  9107  10.
PPBS  9157  10.
PPBS  9357  10.
LOSD  9701  1000   960   930   910   890   870   860   860   860
LOSD  9353  1000   900   860   810   780   760   750   750   750
LOSD  9210  1000   910   870
COMM  CURRENT TIME FRAME ACQ   HD EXPOSURE
VISLP 1500  1350  1  1   100   100   100   100    99    88     1     1     1
VISLT 1500  1350  1  1    11    11    13    19    31    62  9999  9999  9999
VISLP 1500  1350  2  1   100   100   100   100   100   100     1     1     1
VISLT 1500  1350  2  1    11    11    11    12    14    24  9999  9999  9999
VISLP 1500  3350  1  1   100   100   100    99    89    40     1     1     1
VISLT 1500  3350  1  1    11    13    21    35    61   127  9999  9999  9999
VISLP 1500  3350  2  1   100   100   100   100   100    99     1     1     1
VISLT 1500  3350  2  1    11    11    11    12    17    31  9999  9999  9999
VISLP 7300  1350  1  1   100   100   100   100   100    99     1     1     1
VISLT 7300  1350  1  1    21    21    22    26    38    73  9999  9999  9999
VISLP 7300  1350  2  1   100   100   100   100   100   100     1     1     1
VISLT 7300  1350  2  1    21    21    21    21    22    31  9999  9999  9999
VISLP 7300  3350  1  1   100   100   100   100    99    73     1     1     1
VISLT 7300  3350  1  1    21    22    28    43    71   146  9999  9999  9999
VISLP 7300  3350  2  1   100   100   100   100   100   100     1     1     1
VISLT 7300  3350  2  1    21    21    21    21    24    38  9999  9999  9999
VISLP 8310  1350  1  1   100   100   100   100    99    69     1     1     1
VISLT 8310  1350  1  1    18    18    24    38    63   129  9999  9999  9999
VISLP 8310  1350  2  1   100   100   100   100   100    99     1     1     1
VISLT 8310  1350  2  1    18    18    18    20    26    48  9999  9999  9999
VISLP 8310  3350  1  1   100   100    99    98    70    28     1     1     1
VISLT 8310  3350  1  1    18    23    43    73   127   264  9999  9999  9999
VISLP 8310  3350  2  1   100   100   100   100   100    99     1     1     1
VISLT 8310  3350  2  1    18    18    18    22    33    63  9999  9999  9999
VISLP 1350  1500  1  1   100   100   100   100   100    98     1     1     1
VISLT 1350  1500  1  1    11    11    12    15    23    46  9999  9999  9999
VISLP 1350  1500  2  1   100   100   100   100   100   100     1     1     1
VISLT 1350  1500  2  1    11    11    11    11    13    20  9999  9999  9999
VISLP 1350  8310  1  1   100   100   100    99    83    35     1     1     1
VISLT 1350  8310  1  1    11    13    23    39    68   141  9999  9999  9999
VISLP 1350  8310  2  1   100   100   100    99    83    35     1     1     1
VISLT 1350  8310  2  1    11    13    23    39    68   141  9999  9999  9999
VISLP 3350  1500  1  1   100   100   100   100   100    99     1     1     1
VISLT 3350  1500  1  1    21    21    21    23    30    54  9999  9999  9999
VISLP 3350  1500  2  1   100   100   100   100   100   100     1     1     1
VISLT 3350  1500  2  1    21    21    21    21    22    27  9999  9999  9999
VISLP 3350  7300  1  1   100   100   100   100   100    99     1     1     1
VISLT 3350  7300  1  1    21    21    21    25    29    50  9999  9999  9999
VISLP 3350  7300  2  1   100   100   100   100   100   100     1     1     1
```

```
VISLT 3350  7300  2  1    21    21    21    21    21    25  9999  9999  9999
VISLP 3350  8310  1  1   100   100   100   100    99    65     1     1     1
VISLT 3350  8310  1  1    21    22    30    47    79   162  9999  9999  9999
VISLP 3350  8310  2  1   100   100   100   100    99    65     1     1     1
VISLT 3350  8310  2  1    21    22    30    47    79   162  9999  9999  9999
COMM  THESE CARDS ARE NEEDED TO SATISFY PROGRAM ONLY
VISLP 1500  6060  2  1   100   100   100    65     1     1     1     1     1 D 7
VISLT 1500  6060  2  1     5     7    17    39  9999  9999  9999  9999  9999 D 7
VISLP 1500  6060  1  1   100   100   100   100    90     1     1     1     1 D 7
VISLT 1500  6060  1  1     5     5     5     7    28  9999  9999  9999  9999 D 7
VISLP 7300  6060  1  1   100   100   100   100    37     1     1     1     1 D 7
VISLT 7300  6060  1  1    20    20    26    49   212  9999  9999  9999  9999 D 7
VISLP 7300  6060  2  1   100   100   100   100    99     1     1     1     1 D 7
VISLT 7300  6060  2  1    20    20    20    23    73  9999  9999  9999  9999 D 7
VISLP 8310  6060  2  1   100   100    91    26     1     1     1     1     1 D 7
VISLT 8310  6060  2  1    14    29    76   181  9999  9999  9999  9999  9999 D 7
VISLP 8310  6060  1  1   100   100   100   100    49     1     1     1     1 D 7
VISLT 8310  6060  1  1    14    14    17    30   129  9999  9999  9999  9999 D 7
VISLP 6060  1500  1  1   100   100   100   100    24     1     1     1     1 D 7
VISLT 6060  1500  1  1     6     6     9    19    83  9999  9999  9999  9999 D 7
VISLP 6060  7300  1  1   100   100   100   100    24     1     1     1     1 D 7
VISLT 6060  7300  1  1     6     6     9    19    83  9999  9999  9999  9999 D 7
VISLP 6060  8310  1  1   100   100   100    83     7     1     1     1     1 D 7
VISLT 6060  8310  1  1     6     8    17    38   136  9999  9999  9999  9999 D 7
MFACP 1500  1  T   100   100   100   100   100   100   100   100   100
MFACT 1500  1  T    75    75    75    75    75    75    75    75    75
MFACP 1500  1  C   100   100    80    67    25     1     1     1     1
MFACT 1500  1  C   200   200   220   240   260   280   300   320   340
MFACP 7300  1  T   100   100   100   100   100   100   100   100   100
MFACT 7300  1  T    75    75    75    75    75    75    75    75    75
MFACP 7300  1  C   100   100    80    67    25     1     1     1     1
MFACT 7300  1  C   200   200   220   240   260   280   300   320   340
MFACP 8310  1  T   100   100   100   100   100   100   100   100   100
MFACT 8310  1  T    75    75    75    75    75    75    75    75    75
MFACP 8310  1  C   100   100    80    67    25     1     1     1     1
MFACT 8310  1  C   200   200   220   240   260   280   300   320   340
MFACP 1350  1  F   100   100   100   100   100   100   100   100   100
MFACT 1350  1  F   200   200   200   200   200   200   200   200   200
MFACP 1350  1  C   100   100    80    67    25     1     1     1     1
MFACT 1350  1  C   200   200   220   240   260   280   300   320   340
MFACP 3350  1  C   100   100    80    67    25     1     1     1     1
MFACT 3350  1  C   200   200   220   240   260   280   300   320   320
MFACP 3350  1  F   100   100   100   100   100   100   100   100   100
MFACT 3350  1  F   200   200   220   240   260   280   300   320   340
MFACP 6060  1  F   100   100   100   100   100   100   100   100   100
MFACT 6060  1  F   200   200   200   200   200   200   200   200   200
MFACP 6060  1  C   100   100    80    67    25     1     1     1     1
MFACT 6060  1  C   200   200   220   240   260   280   300   320   340
ARTU     7     2     1     1
AATS   1  1350 4314 4852 3564
AATS   1  3350 4200 1560 120029580
AATS   1  1500 8940
AATS   1  7300  670        670
AATS   1  8310 2202
AATS   1  6060 276013500 1200
AATS   2  15009999999999999999
AATS   2  7300 3000
AATS   2  8310  710
AATS   2  13509999999999999999
AATS   2  335099999999999999999999
AATS   2  6060 8480
ARTP  13501000-267  3350 670 -57  6060 670 -57  8350 540-157
MRTP  13501000-267  3350 670 -57  6060 670 -57  8350 540-157
ARTP  1500 800-183  7300 510+164  8310 640-172
MRTP  1500 800-183  7300 510+164  8310 640-172
ATAT     1              1375  2362   100     1     1
ATAT     2              1328  2283   100     1     1
ATAT     3              1596  1766   100     1     1
ATAT     4              1430  3655   100     1     1
ATAT     5              1138  2796   100     1     1
ATAT     6              1316  1820   100     1     1
ATAT     7              1463  1684   100     1     1
ATAT     8              2414  2481   100     1     1
ATAT     9              2271  2097   100     1     1
```

```
ATAT    10                  2298  1327  100    1     1
ATAT    11                  1824  2805  100    1     1
ATAT    12                  1825  2167  100    1     1
ATAT    13                  1689  1573  100    1     1
ATAT    14                  1339  3195  100    2     2
ATAT    15                  1303  2577  100    2     2
ATAT    16                  2347  2353  100    2     2
ATAT    17                  2231  1591  100    2     2
ATAT    18                  2379  1252  100    2     2
ATAT    19                  1785  2502  100    2     2
ATAT    20                  1690  1748  100    2     2
ATAT    21                  1792  1478  100    2     2
ATAS  1468  2968  1259  1804
FODF   101   111
FOAT    12    20
CRIT  0600  0900  0600  0900  0600  0600  0600  0600
IDEN  ENG STUDY - PHASE II    CASE 5
STRG  2500  2500  2250
PREP   200
EXP   3
OUT2
DIST
TABF
GAME
```

3. CONTENT AND FORMAT OF INPUT CARDS

The input cards are presented in the alphabetical order of the title (or type) of the card. Each input card is described on two consecutive pages as follows. The first page discusses the content of the card and the second page the format of the card.

As a first note, the item in the item description column of the format page usually also contains the name of the corresponding variable in the AMSWAG model. The exceptions are items which are packed into a portion of a variable.

As a second note, the index of a variable is often described in the note section of the format page as the ordinal number of some game name as read by the program. In amplification, consider the input card for round choice, EXCP. The necessary inputs to the card are the card title, the alphanumeric firer game name, target game name, first choice short range, first choice long range, second choice short range, second choice long range, and crossover range. The crossover range is stored in the variable XOVR, indexed by firer type and target type, respectively. If the firer and target game names are the second and the fifth weapon game names, respectively in the overall input stream, then the appropriate indices of the variable XOVR are set to two and five, respectively.

As a third note, additional information on card order not previously discussed in Section 2 is presented on the format page.

AATS (Artillery Attrition Factors)

The attrition factors for mortars and artillery versus the appropriate targets are input with this card. The attrition factor has been weighted over caliber, terrain (woods or open fields), and target motion. The AMSWAG model uses a simple one parameter attrition equation (see AMSAA Technical Report No. 169). The attrition factors are the mean times required for one battery of artillery (platoon if mortar) to kill one-half of the target.

NOTE: If the target is a squad, then the expected personnel casualty (P) value is input in card columns 15-19.

CARD TYPE: Artillery Attrition CARD SEQUENCE: See Section 2 NO. CARDS THIS TYPE: As Required.

ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
1	Card Title		'AATS'	NA	A4	1-4
2	Type	1	1 or 2	NA	I2	5-6
3	Target Game Name		NA	NA	A4	11-14
4	F/P Kill Attrition Factor	2	1-99999	Seconds	I5	15-19
5	M Kill Attrition Factor	2	1-99999	Seconds	I5	20-24
6	M/F Kill Attrition Factor	2	1-99999	Seconds	I5	25-29
7	EC Kill Attrition Factor	2	1-99999	Seconds	I5	30-34
8	Not Used		NA	NA	I5	35-39
9	Repeat of Columns 11-39					40-70

NOTE:
1. Use 1 for artillery attrition cards and 2 for mortar attrition cards.
2. See text.

Figure 3.1 Artillery Attrition Factors

AMSAA FORM 1, 6 JUN 75

AOWS (Attacker Overwatch Weapon Starting Range)

This card specifies an axis separation range for attacker overwatch weapons. This range is defined, for a given axis, as the maximum distance that must exist between any attacker and defender unit associated with this axis in order for an attacker overwatch weapon also associated with this axis to be in firing position. Prior to this range, an overwatch weapon does not participate in the battle. If an AOWS card does not appear in an input deck, then the starting range is defaulted to 10,000 meters. A separate range may be specified for each axis.

CARD TYPE: Attacker Overwatch Weapon Starting Range

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'AOWS'	NA	A4	1-4
Starting Range Axis 1, AOWS (1)	1	0-9999	Meters	I4	7-10
Starting Range Axis 2, AOWS (2)	1	0-9999	Meters	I4	13-16
Starting Range Axis 3, AOWS (3)	1	0-9999	Meters	I4	19-22

NOTE: 1. See text.

Figure 3.2 Attacker Overwatch Weapon Starting Range

AMSAA FORM 1, 6 JUN 75

ARTP (Artillery Target Priority)

This card is used to specify target priorities for both the attacker and defender artillery. For each potential target, a priority value (y-intercept) and a slope (change per kilometer) are given. The priority value expresses the worth of the target at a range of zero kilometers and the slope is the change in that value per kilometer of range between the forces.

The target priority value has a significant effect on the allocation of artillery after the preparatory fires phase. The values, as modified by range and slope, determine the relative worth of artillery targets and hence determine the allocation of artillery fires. In this sense the artillery target priorities are different from the direct fire target priorities (TGTP card).

The largest priority value allowed is 9999 and the slope may be between -999 and +9999. However, the combination of the value and slope should not produce a value less than or equal to zero within the range spread between the forces.

The model allows multiple entries per card or multiple cards with one or more entries. Any weapon not listed on an ARTP card will not be attrited by artillery after preparatory fire. In the case of a squad target, the squad game name, not the subelement names, should be used on this card.

CARD TYPE: Artillery Target Priority

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'ARTP'	NA	A4	1-4
Target Game Name	1	NA	NA	A4	7-10
Target Priority Value (0 km), ARTPR(IT)	1,2	1-9999	NA	I4	11-14
Target Priority Slope (Δper km), ARTPRS(IT)	1,2	-999 to 9999	NA	I4	15-18
Repeat of Columns 7-18					
Repeat of Columns 7-18					
Repeat of Columns 7-18					
Repeat of Columns 7-18					

NOTE:
1. See Text.
2. IT is the ordinal number of the target game name as by the program.

Figure 3.3 Artillery Target Priority

AMSAA FORM 1, 6 JUN 75

ARTU (Artillery Units)

This card specifies the total number of artillery and mortar units available to each side. Since the attrition rates for all calibers of artillery are weighted together and the attrition rates for all types of mortars are weighted together, then all types are lumped together on this card.

CARD TYPE: Artillery Units CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'ARTU'	NA	A4	1-4
Number of Attacker Artillery Units, MARTY1	1	0-9999	Batteries or Equiv	I4	7-10
Number of Attacker Mortar Units, MARTY2	1	0-9999	Platoons or Equiv	I4	13-16
Number of Defender Artillery Units, MARTY3	1	0-9999	Batteries or Equiv	I4	19-22
Number of Defender Mortar Units, MARTY4	1	0-9999	Platoons or Equiv	I4	25-28

NOTE: 1. All calibers grouped together.

Figure 3.4 Artillery Units

AMSAA FORM 1, 6 JUN 75

ATAS (Attacker Artillery Stop Fire Line)

When the attacker maneuvering force crosses the line defined by the two points on this card, the model terminates all attrition by the attacker's artillery and mortars. If this feature is not desired, then the card should define a line behind the defender's position.

CARD TYPE: Attacker Artillery Stop Fire Line

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'ATAS'	NA	A4	1-4
X Coordinate of First Point, ATAS(1)	1	0-9999	Meters	I4	7-10
Y Coordinate of First Point, ATAS(2)	1	0-9999	Meters	I4	13-16
X Coordinate of Second Point, ATAS(3)	1	0-9999	Meters	I4	19-22
Y Coordinate of Second Point, ATAS(4)	1	0-9999	Meters	I4	25-28

NOTE:

1. Use game coordinate system where the origin is (0,0).

Figure 3.5 Attacker Artillery Stop Fire Line

ATAT (Attacker's Preplanned Artillery Targets)

These cards specify up to 100 preplanned artillery targets that are fired upon during the preparatory fires part of a case (see PREP card). Each target is given an equal volume of fire within its respective category of either an artillery or a mortar target. These targets are located in the vicinity of the defender.

Although there is an upper limit of 100 targets, the numbering system for the targets can be any values between 1 and 9999. They do not have to be consecutive numbers, but the number for each target must be unique. Normally, only 10 to 20 targets should be used.

The unused portions of this card are the result of revisions made to the AMSWAG artillery routine since the card was designed.

The target size can be any desired except that the current attrition factors are based on 100 meter squares.

(See the DFAT card for the defender's preplanned artillery targets.)

CARD TYPE: Attacker's Preplanned Artillery Targets CARD SEQUENCE: NA NO. CARDS THIS TYPE: As Desired

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'ATAT'	NA	A4	1-4
					5-6
Target Number	1	1-9999	NA	I4	7-10
					11-12
Not Used	2	NA	NA	I4	13-16
					17-18
Not Used	2	NA	NA	I4	19-22
					23-24
X Coordinate (game coordinate system), ATAT (IT,4)	4	1-9999	Meters	I4	25-28
					29-30
Y Coordinate (game coordinate system), ATAT (IT,5)	4	1-9999	Meters	I4	31-34
					35-36
Target Size (Side of Square), IATAT(IT,6)	4	1-9999	Meters	I4	37-40
					41-42
Attrition Code, IATAT(IT,7)	3,4	1 or 2	NA	I4	43-46
					47-48
Type	5	1 or 2	NA	I4	49-52
					53-80

NOTE:
1. See Text.
2. See Text.
3. Use 1 for artillery and 2 for mortars.
4. IT is the ordinal number of the target number as read by the program.

Figure 3.6 Attacker's Preplanned Artillery Targets

AMSAA FORM 1, 6 JUN 75

AVAL (Minimum Target Value to Attacker)

The minimum value of a target against which the attacker will allocate artillery fire is input with this card. The purpose of this card is to reduce computer execution time by eliminating computations for very small fractions of artillery kills.

(See the DVAL card for the minimum target value to defender.)

CARD TYPE: Minimum Target Value to Attacker CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1

COL	ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4	Card Type		1	'AVAL'	NA	A4
5-10	Blank			NA	NA	6X
11-20	VALTOA	Minimun Target Value,	2	0-9999.99999	NA	F10.5

NOTE:
1. Allows designation of the minimum target value at which the attacker will fire.
2. Suggested range of values is 0 at this time.

Figure 3.7 Minimum Target Value to Attacker

AMSAA FORM 1, 6 JUN 75

COMM (Comment)

This card is used to insert comments into the run input stream. During the read of the input stream, an echo of each card is immediately written out.

This card has no other effect upon the program.

CARD TYPE: Comment

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: As Many As Desired

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'COMM'	NA	A4	1 2 3 4

NOTE:

Figure 3.8 Comment

AMSAA FORM 1, 6 JUN 75

CRIT (Cutoff Criteria)

This card is used to specify the casualty levels to be used as an end of game criteria for a case. Criteria consists of a specified level of losses for:

a. attacker vehicles only

b. attacker personnel only

c. defender vehicles only

d. defender personnel only

e. a combination of attacker vehicles and personnel

f. a combination of defender vehicles and personnel

The game ends when any one of the specified criteria is met.

If no CRIT card is used in a case, the following default values for the above criteria are used:

a. 60%

b. 60%

c. 60%

d. 60%

e. 40% and 40%

f. 40% and 40%

AMSAA FORM 1, 6 JUN 75

CARD TYPE: Cutoff Criteria CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

NOTE:

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'CRIT'	NA	A4	1-4
Level of Attacker Vehicle Losses, CUTOFF(1)		0-1000	Tenths of Percent	I4	7-10
Level of Attacker Personnel Losses, CUTOFF(2)		0-1000	Tenths of Percent	I4	13-16
Level of Defender Vehicle Losses, CUTOFF(3)		0-1000	Tenths of Percent	I4	19-22
Level of Defender Personnel Losses,CUTOFF(4)		0-1000	Tenths of Percent	I4	25-28
Level of Attacker Vehicle Losses for Combination Criteria, CUTOFF(5)		0-1000	Tenths of Percent	I4	31-34
Level of Attacker Personnel Losses for Combination Criteria, CUTOFF(6)		0-1000	Tenths of Percent	I4	37-40
Level of Defender Vehicle Losses for Combination Criteria, CUTOFF(7)		0-1000	Tenths of Percent	I4	43-46
Level of Defender Personnel Losses for Combination Criteria, CUTOFF(8)		0-1000	Tenths of Percent	I4	49-52

Figure 3.9 Cutoff Criteria

DFAT (Defender's Preplanned Artillery Targets)

These cards specify up to 100 preplanned artillery targets that are fired upon during the preparatory fires part of a case (see PREP card). Each target is given an equal volume of fire within its respective category of either an artillery or a mortar target. These targets are located along the attacker's routes of approach used during the early part of the battle.

Although there is an upper limit of 100 targets, the numbering system for these targets can be any values between 1 and 9999. They do not have to be consecutive numbers, but the numbers for each target must be unique. Normally only 10 to 20 targets should be used.

The unused portions of this card are the result of revisions made to the AMSWAG artillery routine since the card was designed.

The target size can be any desired except that the current attrition factors are based on 100 meter squares.

(See the ATAT card for the attacker's preplanned artillery targets.)

CARD TYPE: Defender's Preplanned Artillery Targets

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: As Desired

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'DFAT'	NA	A4	1-4
Target Number	1	1-9999	NA	I4	5-8
Not Used	2	NA	NA	I4	9-12
Not Used	2	NA	NA	I4	13-16
X Coordinate (Game Coordinate System), DFAT(IT,4)	4	1-9999	Meters	I4	17-20
Y Coordinate (Game Coordinate System), DFAT(IT,5)	4	1-9999	Meters	I4	21-24
Target Size (Side of Square), IDFAT(IT,6)	4	1-9999	Meters	I4	25-28
Attrition Code, IDFAT(IT,7)	3,4	1 or 2	NA	I4	29-32
Type, IDFAT	3	1 or 2	NA	I4	33-36
Not Used		NA	NA	I4	37-40

NOTE:

1. See Text
2. See Text
3. Use 1 for artillery and 2 for mortars
4. IT is the ordinal number of the target number as read by the program

Figure 3.10 Defender's Preplanned Artillery Targets

AMSAA FORM 1, 6 JUN 75

DISM (Dismount Criteria)

The primary purpose of this card is to define the conditions on an axis in order for a dismount on this axis to occur. The conditions are that the range between the attacker and defender units on the axis is between two specified ranges and that the fraction of mobility losses of units on the axis is greater than a specified number.

When the conditions are met, new units are created for the dismounted squads and the vehicles and squads are treated as separate entities. The squads then normally move down the route at a reduced rate of speed and the vehicles normally halt in hull defilade. However, this card contains tactics (see 'TACS' card) for both the squad units and vehicle units. These tactics are executed when a dismount occurs. All tactics listed on the 'TACS' card are acceptable except for the 'WAIT' tactic. In addition, a distance for the vehicles to follow behind the squads can be specified. In this situation, the tactic specified for the vehicles is 'HALT' and the model initiates movement of the vehicles (at the same speed as the squads) when the squads get the specified distance ahead.

If a deliberate dismount on an axis is desired, then the fraction of mobility losses on the card can be set to zero. If no dismount on an axis is desired, then the ranges on the card can be set to zero or the DISM card for the axis can be eliminated.

CARD TYPE: Dismount Criteria CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1 Per Route

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'DISM'	NA	A4	1-4
Axis Number, IAX		1-3	NA	I2	5-6
Maximum Range for Dismount, DSULIM(IAX)	1	0-9999	Meters	F6.0	7-12
Minimum Range for Dismount, DSLLIM(IAX)	2	0-9999	Meters	F6.0	13-18
Following Distance, DSTRAL(IAX)	5	0-9999	Meters	F6.0	19-24
Fractional Mobility Losses, DSCRI(IAX)	4	0-1.000	NA	F6.3	25-30
					31-32
Vehicle Tactic Type, TITLE(1)	5	'HALT' 'SLOW' or 'MOVE'	NA	A4	33-36
Slowdown Factor, DSSLOV(IAX)	5	2-99	NA	I6	37-42
					43-44
Personnel Tactic Type, TITLE(2)	5	'HALT' 'SLOW' or 'MOVE'	NA	A4	45-48
Slowdown Faccor, DSSLOP(IAX)	5	2-99	NA	I6	49-54
					55-80

NOTE:
1. Dismount will not occur if force-on-force range for this axis is greater than this value.
2. Dismount will not occur if force-on-force range for this axis is less than this value.
3. The vehicles will follow the squads by this distance. If this option is not desired, this value should be zero.
4. Dismount will not occur if the fractional mobility losses on this axis are less than this value.
5. See text and see 'TACS' card.

Figure 3.11 Dismount Criteria

AMSAA FORM 1, 6 JUN 75

DIST (Optional Distribution Output)

The use of this card prints a firing event summary at the end of a case.

CARD TYPE: Optional Distribution Output CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Type	1	'DIST'	NA	A4	1-4

NOTE: 1. Use of this card causes the rounds per kill and time per kill summarized as a function of range, exposure, and motion to print out at the end of a case.

Figure 3.12 Optional Distribution Output

DISW (Dismount Weapon)

This card specifies the attacker weapon types, normally armored personnel carriers (APC's), which may dismount squads if a dismount occurs. The card allows up to twelve different types to be specified. If more than twelve types are required, second and successive cards may be used. The model also allows the option of multiple entries per card or multiple cards with one or more entries. For example, if it is desired to specify five different weapon types, then all five may be put on one card, or one each on five cards or two on one card and three on another, etc.

CARD TYPE: Dismount Weapon CARD SEQUENCE: See Section 2 NO. CARDS THIS TYPE: As Required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title				A4	1-4
Dismount Weapon Game Name	1	'DISW'	NA	A4	7-10
Repeat of Columns 7-10		NA	NA		13-16

NOTE: 1. Specify the attacking weapon types which may dismount squads if a dismount occurs.

Figure 3.13 Dismount Weapon

DPOS (Defender Position Offset)

This card specifies a defender offset distance in the computation of the center of mass (position) of the defenders associated with a given axis.

Acquisition between an attacker maneuver unit on an axis and defender units associated with the axis is not allowed to occur if the range between the attacker maneuver unit and the defender center of mass for that axis exceeds a certain value (See STRG card). The purpose is to prevent premature initiation of battle on an axis before the "average defender unit" is within acquisition range.

As an example, the x-coordinate of the defender center of mass for Axis 1 is computed as follows:

$$\sum_{I1} \frac{DPOS\ (1,1) + X(I1)}{ND1}$$

Where:

DPOS (1,1) represents the x-coordinate offset for Axis 1 (specified on this card).

X(I1) represents the x-coordinate of an active defender unit associated with Axis 1.

ND1 - represents the number of active defender units associated with Axis 1.

Similarly, the y-coordinate of the defender center of mass for Axis 1 is defined as:

$$\sum_{I1} \frac{DPOS\ (1,2) + Y(I1)}{ND1}$$

Where:

DPOS (1,2) represents the y-coordinate offset for Axis 1 (specified on this card).

Y (I1) represents the y-coordinate of an active defender unit associated with Axis 1.

ND1 - As before

AMSAA FORM 1, 6 JUN 75

CARD TYPE: Defender Position Offset CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title			'DPOS'	NA	A4	1-4
					2X	5-6
X-Coordinate Offset, Axis 1, DPOS(1,1)			0-9999	Meters	I4	7-10
Y-Coordinate Offset, Axis 1, DPOS (1,2)			0-9999	Meters	I4	11-14
					2X	15-16
X-Coordinate Offset, Axis 2, DPOS (2,1)			0-9999	Meters	I4	17-20
Y-Coordinate Offset, Axis 2, DPOS (2,2)			0-9999	Meters	I4	21-24
					2X	25-26
X-Coordinate Offset, Axis 3, DPOS (3,1)			0-9999	Meters	I4	27-30
Y-Coordinate Offset, Axis 3, DPOS (3,2)			0-9999	Meters	I4	31-34

NOTE:

Figure 3.14 Defender Position Offset

DXO, DYO, DXH, DYH, DXM, DYM
(Fixed Biases for Stationary Firer, Stationary Target)

These cards are used to enter the fixed biases for a stationary firer shooting at a stationary target. If one or more of these cards are used for a round, then all must be used, even if only to specify zeros for the biases. These cards are needed only for those rounds for which biases are furnished to the AMSWAG user. The cards are:

a. DXO - Horizontal bias for first round

b. DYO - Vertical bias for first round

c. DXH - Horizontal bias for subsequent round given a hit on preceding round

d. DYH - Vertical bias for subsequent round given a hit on preceding round

e. DXM - Horizontal bias for subsequent round given a miss on preceding round

f. DYM - Vertical bias for subsequent round given a miss on preceding round

The range interval used is that used for this round in its constant data.

NOTE: The 'O' in DXO and DYO is an alphabetic character.

CARD TYPE: Fixed Biases for Stationary Firer, Stationary Target

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: See Text

COL	ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-3	Card Title		As Approp	NA	A3
4-7	Round Game Name		NA	NA	A4
8-12	Bias for Range 1, SSBASX or SSBASY	1,2	-9999 to 99999	Hundredths of Mils	I5
13-17	Bias for Range 2, SSBASX or SSBASY	1,2	-9999 to 99999	Hundredths of Mils	I5
18-37	.	.	.	.	.
38-42	Bias for Range 7, SSBASX or SSBASY	1,2	-9999 to 99999	Hundredths of Mils	I5
43-80					

NOTE:
1. See Text
2. SSBASX or SSBASY is an array indexed on range increment, first or subsequent round fired, and ordinal number of the round game name as read by the program.

Figure 3.15 Fixed Biases for Stationary Firer, Stationary Target

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DVAL (Minimum Target Value to Defender)

The minimum value of a target against which the defender will allocate artillery fire is input with this card. The purpose of this card is to reduce computer execution time by eliminating computations for very small fractions of artillery kills.

(See the AVAL card for the minimum target value to attacker.)

CARD TYPE: Minimum Target Value to Defender CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	1	'DVAL'	NA	A4	1-4
Blank		NA	NA	6X	5-10
Minimum Target Value, VALTOD	2	0-9999. 99999	NA	F10.5	11-20

NOTE:
1. Allows designation of the minimum target value at which the defender will fire.
2. Suggested range of values is 0 at this time.

Figure 3.16 Minimum Target Value to Defender

AMSAA FORM 1, 6 JUN 75

EXCP (Round Choice)

This card specifies the rounds to be fired for each firer-target pair. Four different categories of round choices exist. These are:

a. The first choice round for short range firings.

b. The first choice round for long range firings.

c. The second choice round for short range firings.

d. The second choice round for long range firings.

The crossover range between short and long range may also be specified on the card. If the crossover range is not given, it is defaulted to 1250 meters. The 'XRRG' card may also be used to change the crossover range.

The model attempts to use the first choice round (for the appropriate range) for a firing event. If some reason prevents this round from being used (e.g., all rounds expended), then the model uses the second choice round. If neither choice can be used, then this firer does not fire at nor allocate himself to this target.

If a second choice is not specified on the card, then the first choice is the only choice used by the model. If a round is specified that does not appear on the weapon card, then an error print occurs and the model stops prior to executing the case. A summary of round choices is printed by the model near the beginning of the output for a case.

A maximum of 150 EXCP cards may be stored by the model.

CARD TYPE: Round Choice CARD SEQUENCE: See Note 1. NO. CARDS THIS TYPE: 1 per firer-target pair

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'EXCP'	NA	A4	1-4
Firer Game Name	2	NA	NA	A4	5-10
Target Game Name	2	NA	NA	A4	13-16
1st Choice Short Range	2	NA	NA	A4	19-22
1st Choice Long Range	2	NA	NA	A4	25-28
2nd Choice Short Range	3	NA	NA	A4	31-34
2nd Choice Long Range	3	NA	NA	A4	37-40
Crossover Range, XOVR	3	0-9999.	Meters	F6.0	53-58

NOTE:
1. This card must precede any XRRG cards. Also, see Section 2.
2. Required - see text
3. Optional - see text

Figure 3.17 Round Choice

AMSAA FORM 1, 6 JUN 75

EXCV (Exception to Lethality/Vulnerability)

Normally the name of the lethality/vulnerability data set to be used for a round-target pair is formed from the round lethality game name and the target vulnerability game name found on the 'WPN' card. However, the EXCV card may be used to specify the name of a lethality/vulnerability data set different from the one formed from the game names. This change does not affect any other targets for this round or any other rounds against this target.

This card allows ease in using any set of lethality/vulnerability data in the AMSWAG data base. A maximum of 150 EXCV cards may be stored by the model. These cards must follow the WPN cards. If a round or target game name is used on an EXCV card and that name is not on a WPN card, then an error message is printed and the model stops prior to executing the case.

CARD TYPE: Exception to Lethality/Vulnerability CARD SEQUENCE: See Section 2 NO. CARDS THIS TYPE: As Required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'EXCV'	NA	A4	1-4
					5-6
Round Game Name	1	NA	NA	A4	7-10
					11-12
Target Game Name	1	NA	NA	A4	13-16
					17-18
New Round Lethality Name	2	NA	NA	A4	19-22
					23-24
New Target Vulnerability Name	2	NA	NA	A4	25-28

NOTE:
1. Game names of the round-target pair for which a change in vulnerability data are wanted.
2. These names apply to this one round-target pair only. For others pairs with this round or this target, the WPN card lethality/vulnerability names will be used unless other EXCV cards are used.

Figure 3.18 Exception to Lethality/Vulnerability

EXP (Defender Exposure)

In all previous studies all defender targets were assumed to be in hull defilade to each opposing attacker firer. The probability of hit of each defender target is now considered to be a weighted average of the probability of hit of a target in hull defilade (HD) exposure and the probability of hit of a target in full exposure (FE) according to the following scheme:

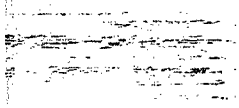
$$P_{HIT} = C \times P_{HIT(HD)} + (1-C) \times P_{HIT(FE)}$$

where $P_{HIT(HD)}$ = probability of hit of a target in hull defilade exposure.

$P_{HIT(FE)}$ = probability of hit of a target in full exposure.

$C = .5 + \frac{(I)}{3} \times .5$; where I = 0, 1, 2, 3 and is defined as a numerical index of the level of defender site preparation.

If I is 0, i.e., no engineer preparation of defender sites, then the exposure of each defender target is an equal average of hull defilade exposure and full exposure. If I is 3, i.e., complete engineer preparation of defender sites, then the exposure of each defender target is full hull defilade. If I is between 0 and 3, i.e., some but not complete engineer preparation of defender sites, then the exposure of each target is in between the above two cases.



FOAT (Attacker Forward Observer)

This card specifies those attacker units which act as artillery/mortar forward observers. After the preparatory fires phase of the artillery routine, only those targets acquired by forward observer units can receive an allocation of artillery/mortar fires. Only one FOAT card is allowed per case.

(See the FODF card for defender forward observer.)

CARD TYPE: Attacker Forward Observer

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 1

ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
1	Card Type	1	'FOAT'	NA	A4	1-4
2	Forward Observer 1, FOATT(1)	2	1-100	NA	I4	7-10
3	Forward Observer 2, FOATT(2)	2	1-100	NA	I4	13-16
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
10	Forward Observer 10, FOATT(10)	2	1-100	NA	I4	61-64

NOTE:

1. Designates attacker units as arty/mtr forward observers. Limited to 10 attacker units. Used for post-preparatory artillery/mortar fires.
2. Unit number

Figure 3.20 Attacker Forward Observer

FODF (Defender Forward Observer)

This card specifies those defender units which act as artillery/mortar forward observers. After the preparatory fires phase of the artillery routine, only those targets acquired by forward observer units can receive an allocation of artillery/mortar fires. Only one FODF card is allowed per case.

(See the FOAT card for attacker forward observer.)

CARD TYPE: Defender Forward Observer

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Type	1	'FODF'	NA	A4	1-4
Forward Observer 1, FODEF(1)	2	101-164	NA	I4	7-10
Forward Observer 2, FODEF(2)	2	101-164	NA	I4	13-16
.	.	.	.	.	.
Forward Observer 10, FODEF(10)	2	101-164	NA	I4	61-64

NOTE:
1. Designates defender units as arty/mtr forward observers. Limited to 10 defender units. Used for post-preparatory artillery/mortar fires.
2. Unit number.

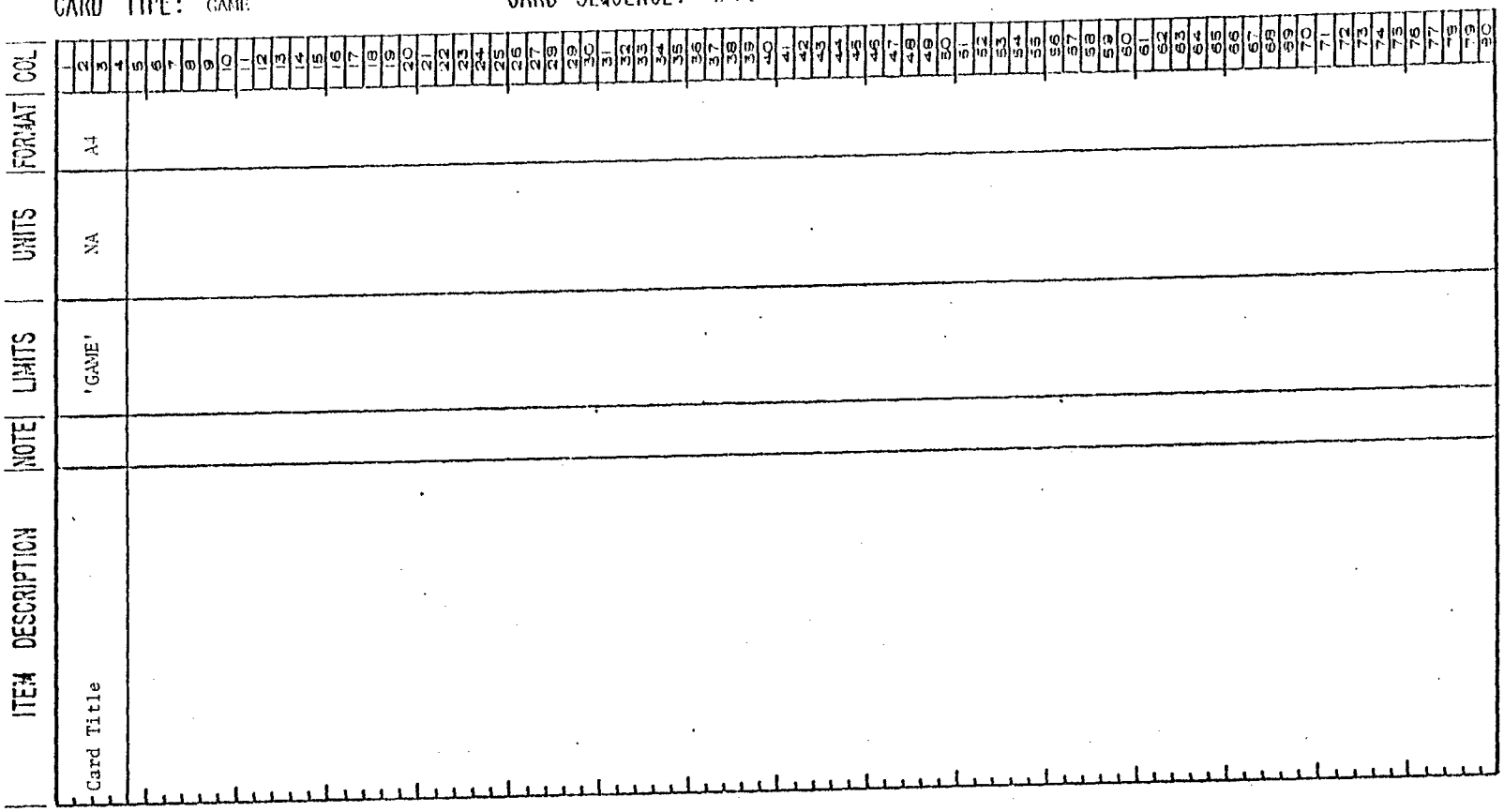
Figure 3.21 Defender Forward Observer

AMSAA FORM 1, 6 JUN 75

GAME

This card signals the end of the input deck and starts the execution of a case.

CARD TYPE: GAME CARD SEQUENCE: Last NO. CARDS THIS TYPE: 1



NOTE:

Figure 3.22 Game

AMSAA FORM 1, 6 JUN 75

GFAC (Grunt Factor)

This card specifies the maximum number of squads that may be carried in one attacking armored personnel carrier (APC). This factor is used to determine the squad carrying capability of APC's that have suffered vehicle losses faster than they have suffered squad losses. It is used to prevent one APC from carrying four or five squads after the other APC's in the unit have been killed. The surplus squads (above the grunt factor) are "left behind" and treated as battle losses.

If no grunt factor is specified, the model assumes 2.00. Currently, a grunt factor of 1.75 is used for BLUE APC's and a factor of 1.50 is used for RED APC's.

CARD TYPE: Grunt Factor CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'GFAC'	NA	A4	1-4
Grunt Factor, GFAC	1	0.0-99.9	Squads	F4.1	7-10

NOTE: 1. See Text

Figure 3.23 Grunt Factor

AMSAA FORM 1, 6 JUN 75

ID (Identification)

This card specifies a unique case identification and defines some general parameters for the case.

CARD TYPE: Identification CARD SEQUENCE: 1st NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'ID'	NA	A4	1-4
					5-6
Run Identifier, RUNID	1	NA	NA	A10	7-16
Unit Information File Name, JFILN		NA	NA	A10	17-26
Attacker Identifier, R1	2	'RA' or 'BA'	NA	A2	27-28
					29-80

NOTE:

1. Any ten character identification desired for this case. This identification is printed on the last page of output for the case.
2. R1 is 'RA' for a Red attack and 'BA' for a Blue attack. Any other value causes an error print (#1) and termination of the case at time zero.

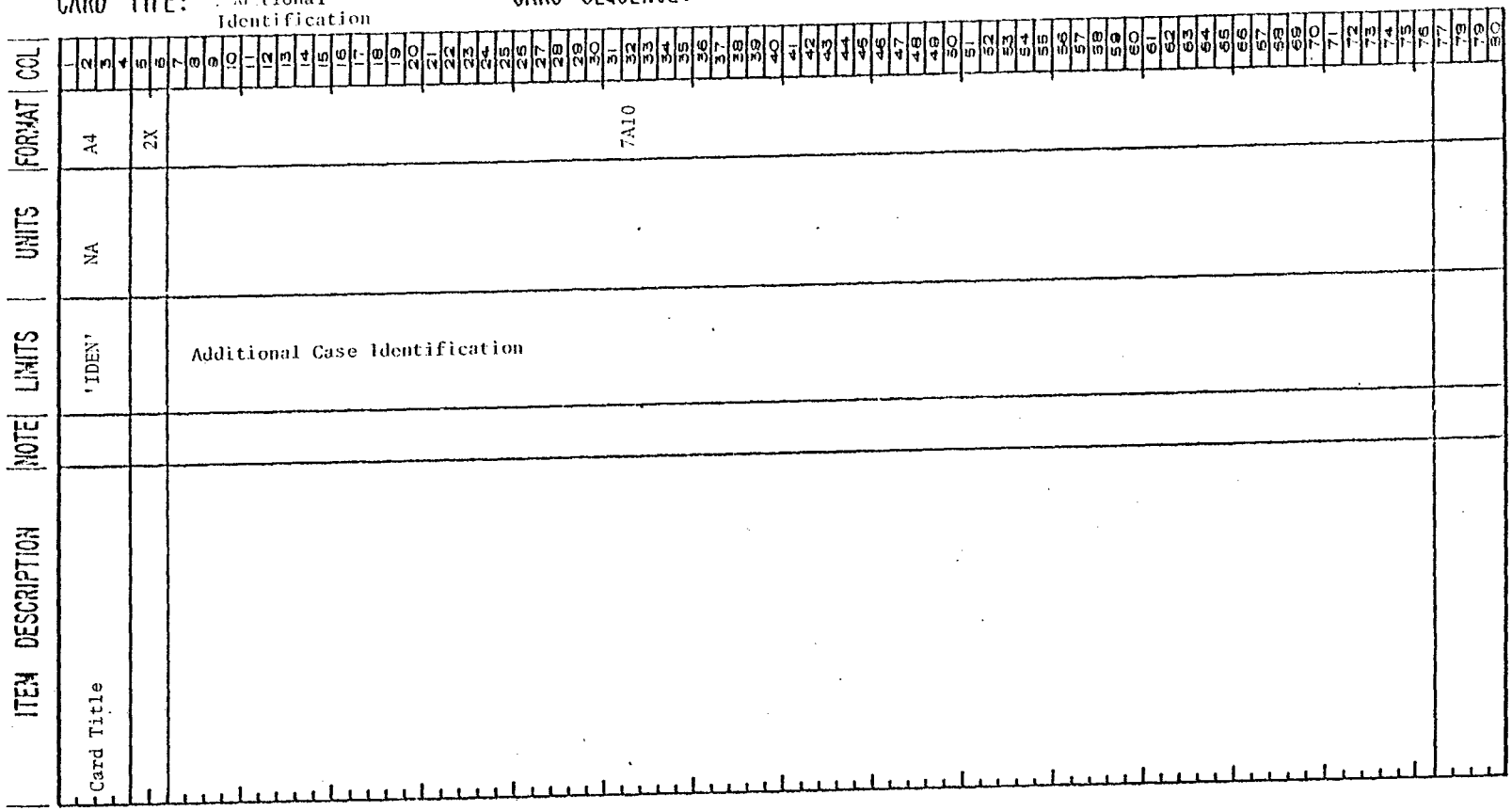
Figure 3.24 Identification

AMSAA FORM 1, 6 JUN 75

IDEN (Additional Case Identification)

The identification given on this card is printed at the top of each victim-killer scoreboard page (see Figure 4.6) and the last page of a case.

CARD TYPE: Additional Identification CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1



NOTE:

Figure 3.25 Additional Identification

AMSAA FORM 1, 6 JUN 75

KILL (Kill Criteria)

This card specifies the kill criteria for the determination of kind of kill against each weapon type. The following table gives the usual choices.

Weapon Type	Kill Criteria
Attacking Tank	MOF (M or F Kill)*
Attacking APC	F, M, M/F, EC (M and F kill and mounted squad kills)*
Attacking Overwatch Vehicle	F (F Kill)**
Attacking Overwatch Personnel	P (Personnel Kill)***
Defending Vehicles	F (F Kill)**
Defending Personnel	P (Personnel Kill)***
Attacking Squads	P (Personnel Kill)***

*The MOF criterion means that the vehicle is considered as a loss if it suffers either a firepower kill or a mobility kill. The F, M, M/F criteria means that a vehicle that suffers a mobility kill will stop and keep firing; a vehicle which suffers a firepower kill will keep moving (if it still has mounted squads); and only those vehicles which suffer both mobility and firepower kills are counted as complete losses. The EC criterion refers to kills of mounted squads.

**Mobility kills are not evaluated against stationary targets which never move (e.g., defender and attacker overwatch targets.)

***Used against dismounted personnel to include ground mounted antitank missiles. The kill criterion is only needed for the squad, not the squad subelements.

CARD TYPE: Kill Criteria CARD SEQUENCE: See Section 2 NO. CARDS THIS TYPE: 1 per Weapon Type

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'KILL'	NA	A4	1-4
					5-6
Weapon Game Name		NA	NA	A4	7-10
					11-12
Kill Criterion 1, KILL(IW)	1,2	F,P,M,M/F MOF, EC	NA	A3	13-15
					16-17
Kill Criterion 2 (if needed), KILL (IW)	1,2	F,M,M/F EC	NA	A3	18-20
					21-22
Kill Criterion 3 (if needed),KILL(IW)	1,2	F,M,M/F, EC	NA	A3	23-25
					26-27
Kill Criterion 4 (if needed),KILL(IW)	1,2	EC	NA	A3	28-30
					31-80

NOTE:
1. See Text
2. IW is the ordinal number of the weapon game name as read by the program.

Figure 3.26 Kill Criteria

AMSAA FORM 1, 6 JUN 75

LEFT

This card designates an attacking squad subelement to be left in an overwatch position when the squad dismounts. If no LEFT card is in an input deck, then no weapon is left behind. In addition to being specified on the LEFT card, the weapon must also have the largest priority value on the SQBA card of any subelement. After a dismount, the rest of the squad executes the tactic specified on the DISM card and the LEFT element maintains a "hull defilade" overwatch posture.

If the left option is used, then the subelement given on the LEFT card must also have other input cards not normally used for squad subelements. These are: ARTP and MRTP (as target); KILL, SUPP; PERS; VISL and MFAC (as looker and lookee); RELD and RLOS.

CARD TYPE: Squad Overwatch After Dismount

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 1

COL	FORMAT	UNITS	LIMITS	NOTE	ITEM DESCRIPTION
1-4	A4	NA	'LEFT'		Card Title.
5-6					
7-10	A4	NA	NA	1	Attacking Squad Subelement Game Name, ISPWN
11-80					

NOTE: 1. See Text.

Figure 3.27 Squad Overwatch After Dismount

AMSAA FORM 1, 6 JUN 75

LOAD (Basic Load)

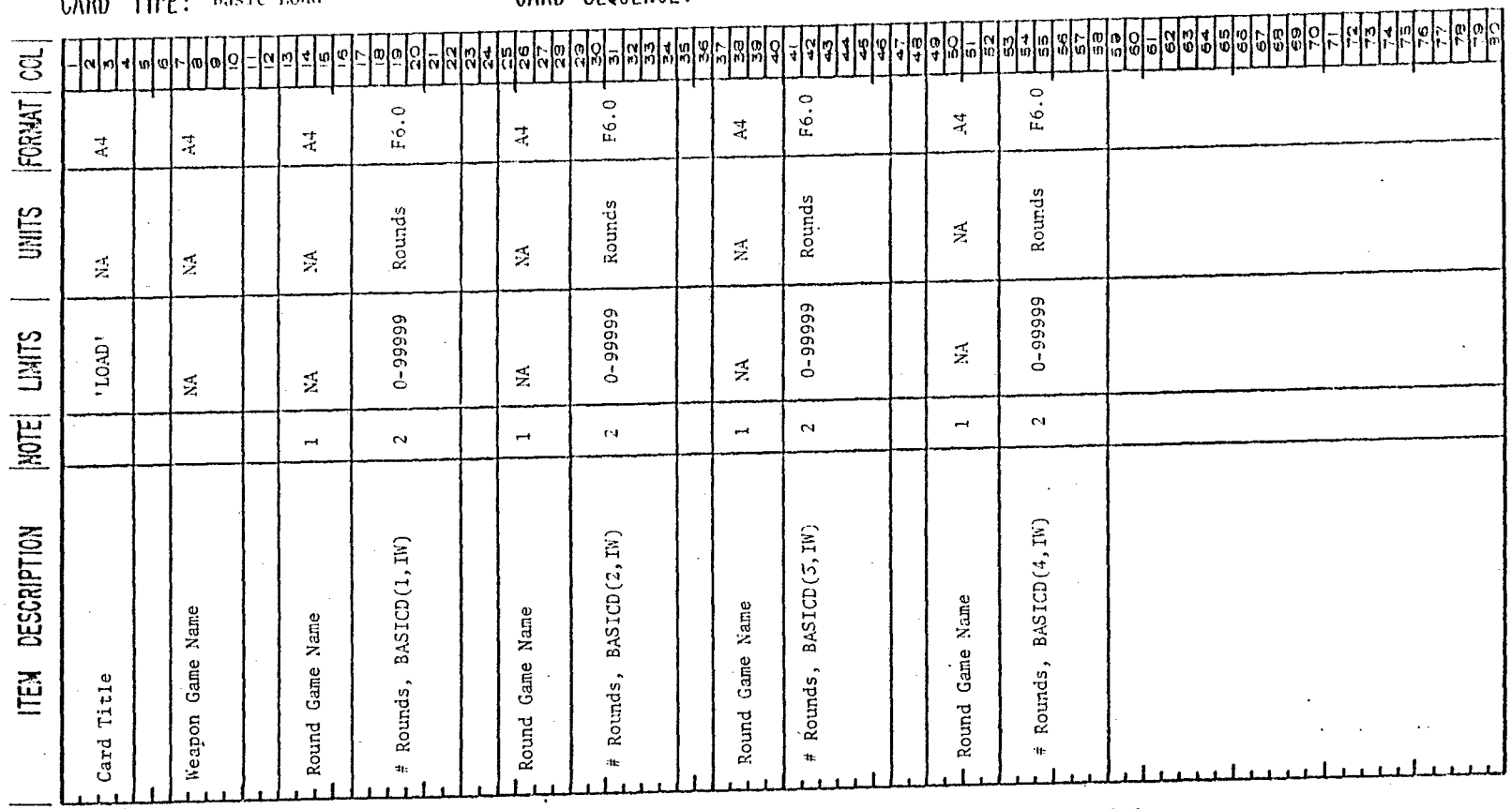
This card specifies the quantity of ammunition for each type of round for a weapon system as given on the WPN, SQED, and SQEA cards. If no LOAD card for a weapon is in the input deck, then that weapon is given 9999.9 rounds for each type of ammunition it has. If a LOAD card is in the input deck, but a type of ammunition has been left off, then that type is given 0.0 rounds for this case.

A LOAD card is required for the squad subelements as well as for the squad itself. The card for the squad should list no rounds. The cards for the squad subelements give the basic loads for the subelements. Failure to give a roundless LOAD card for the squad game name results in erroneous round summaries to be printed in the unit status part of the case output.

CARD TYPE: Basic Load

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Required



ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'LOAD'	NA	A4	1-4
					5-6
Weapon Game Name		NA	NA	A4	7-10
					11-12
Round Game Name	1	NA	NA	A4	13-16
# Rounds, BASICD(1,IW)	2	0-99999	Rounds	F6.0	17-22
					23-24
Round Game Name	1	NA	NA	A4	25-28
# Rounds, BASICD(2,IW)	2	0-99999	Rounds	F6.0	29-34
					35-36
Round Game Name	1	NA	NA	A4	37-40
# Rounds, BASICD(3,IW)	2	0-99999	Rounds	F6.0	41-46
					47-48
Round Game Name	1	NA	NA	A4	49-52
# Rounds, BASICD(4,IW)	2	0-99999	Rounds	F6.0	53-58
					59-80

NOTE:
1. Only those rounds listed on a WPN, SQEA or SQED card for this weapon or squad subelement.
2. IW is the ordinal number of the weapon game name as read by the program.

Figure 3.28 Basic Load

AMSAA FORM 1, 6 JUN 75

LOSD (Line-of-Sight Duration)

This card specifies the probability of normal firing event completion, indexed on round and range. In the primary case of a slow firing missile, the probability accounts for aborts because of line of sight breaks while the missile is in flight. The probability is used to degrade the attrition from a firing event.

CARD TYPE: Line-of-Sight Duration

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Needed

COL	ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4	Card Title		'LOSD'	NA	A4
5-6					
7-10	Round Game Name		NA	NA	A4
11-12					
13-16	Probability of Normal Engagement at 0 Meters, SUCCES (IR,1)	1,2	0-1000	Thousandths	I4
17-18					
19-22	Probability of Normal Engagement at 500 Meters, SUCCES (IR,2)	1,2	0-1000	Thousandths	I4
23-24					
25-26	.	.	.	.	.
27-28	.	.	.	.	.
29-30	.	.	.	.	.
31-34	.	.	.	.	.
35-36	.	.	.	.	.
37-40	.	.	.	.	.
41-42	.	.	.	.	.
43-46	.	.	.	.	.
47-48	.	.	.	.	.
49-52	.	.	.	.	.
53-54	.	.	.	.	.
55-58	.	.	.	.	.
59-60	.	.	.	.	.
61-64	Probability of Normal Engagement at 4000 Meters, SUCCES (IR,9)	1,2	0-1000	Thousandths	I4
65-80					

NOTE:

1. Usually a non-normal engagement is one in which line-of-sight is interrupted while the projectile is in flight.
2. IR is the ordinal number of the round game name as read by the program.

Figure 3.29 Line-of-Sight Duration

AMSAA FORM 1, 6 JUN 75

LPR2 (Firer-Target Status)

This card specifies time bands in the game during which the status of each firer-target combination is printed. The possible statuses are:

Title	Description
OK	Target available to receive fire
NEFF	Range > maximum range for stationary firer
2 FAR	Range > maximum effective range
N GD	Target no longer exists
COVD	No line of sight
NACQ	Target not acquired
N SH	No rounds for target (either no rounds at all or firer is moving and round cannot be fired from a moving platform)

CARD TYPE: Firer-Target Status CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'LPR2'	NA	A4	1-4
Initial Time 1, PR2(1,1)		0-9999	Secs	I4	7-10
End Time 1, PR2(1,2)		0-9999	Secs	I4	13-16
Initial Time 2, PR2(2,1)		0-9999	Secs	I4	19-22
End Time 2, PR2(2,2)		0-9999	Secs	I4	25-28
.		.	.	.	31-34
.		.	.	.	37-40
.		.	.	.	43-46
.		.	.	.	49-52
Initial Time 5, PR2(5,1)		0-9999	Secs	I4	55-58
End Time 5, PR2(5,2)		0-9999	Secs	I4	61-64

NOTE:

Figure 3.30 Firer-Target Status

AMSAA FORM 1, 6 JUN 75

MFAC (Visual Target Acquisition Factor)

This card specifies a set of adjustment factors for one or the other of the parameters P_∞ and $\overline{t}$ of the distribution function for visual acquisition (see VISL card), indexed by range. A set of factors is necessary for each of the conditions firer motion, target motion, and target concealment. A particular factor, say AF, produces a new parameter, P_∞ * or $\overline{t}$*, according to the following scheme.

Parameter	Factor Type	Result
P_∞	Firer Motion	$P_\infty^* = P_\infty \cdot AF$
P_∞	Target Motion	$(1-P_\infty)^* = (1-P_\infty) \cdot AF$
P_∞	Target Concealment	$P_\infty^* = P_\infty \cdot AF$
$\overline{t}$	Firer Motion	$\overline{t}^* = \overline{t} \cdot AF$
$\overline{t}$	Target Motion	$\overline{t}^* = \overline{t} \cdot AF$
$\overline{t}$	Target Concealment	$\overline{t}^* = \overline{t} \cdot AF$

Note: P_∞ * must be between 0.00 and 1.00.

(See the VISL card visual (non-firing) target acquisition data).

CARD TYPE: Visual Target Acquisition Factor

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: One For Each Of Firer Motion, Target Motion, Target Concealment Conditions

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title				A4	1-4
Data Type	1	'P' or 'T'	NA	A1	5
Looker or Lookee Game Name	2	NA	NA	A4	7-10
Data Set	3	'1' or '2'	NA	I1	13
Factor type	4	'F', 'T' or 'C'	NA	A1	16
Data for 0 M	5	0-99.99	Hundredths	I4	19-20
Data for 500 M	5	0-99.99	Hundredths	I4	25-26
Data for 4000 M	5	0-99.99	Hundredths	I4	67-68

NOTE:

1. 'P' for probability of ultimate detection (P_∞).
   'T' for mean time to detect ($\bar{t}$) given a detection.
2. Looker if factor type is 'F' or 'T'. Lookee if factor type is 'C'.
3. '1' for hull defilade. '2' for fully exposed.
4. 'F' for moving firer factors. 'C' for concealment factors.
   'T' for moving target factors.
5. See Text.

Figure 3.31 Visual Target Acquisition Factor

AMSAA FORM 1, 6 JUN 75

MINE

This card indicates that minefields are being played. Also, for a particular minefield number and game weapon name, the card specifies the probabilities of dud, detection, activation, firepower only kill, mobility only kill, and mobility and firepower kill.

CARD TYPE: MINE

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: 1 Per Minefield

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'MINE'	NA	A4	1-4
Minefield Number		1-20	NA	I2	7-8
Game Weapon Name		NA	NA	A4	11-14
Probability of Dud, PPDUD(IM, IW)	1	0-1.0	NA	F5.2	17-21
Probability of Detection, PPDET(IM, IW)	1	0-1.0	NA	F5.2	25-28
Probability of Activation, PPACT(IM, IW)	1	0-1.0	NA	F5.2	33-35
Probability of Firepower Only Kill, PPK(IM, IW, 1)	1	0-1.0	NA	F5.2	40-42
Probability of Mobility Only Kill, PPK(IM, IW, 2)	1	0-1.0	NA	F5.2	46-49
Probability of Mobility and Firepower Kill, PPK (IM, IW, 3)	1	0-1.0	NA	F5.2	52-56

NOTE: 1. IM is the minefield number.
IW is the ordinal number of the game weapon name as read by the program.

Figure 3.32 Mine

AMSAA FORM 1, 6 JUN 75

MRTP (Mortar Target Priority)

This card is used to specify target priorities for both the attacker and defender mortars. For each potential target, a priority value (y-intercept) and a slope (change per kilometer) are given. The priority value expresses the worth of the target at a range of zero kilometers and the slope is the change in that value per kilometer of range between the forces.

The target priority values as modified by range and slope determine the relative worth of mortar targets and hence determine the allocation of mortar fires. In this sense the mortar target priorities are different from the direct fire target priorities (TGTP card).

The largest priority value allowed is 9999 and the slope may be between -999 and +999. However, the combination of the value and slope should not produce a value less than or equal to zero within the range spread between the forces.

The model allows multiple entries per card or multiple cards with one or more entries. Any weapon not listed on an MRTP card is not attrited by mortar after the preparatory fires. In the case of a squad target, the squad game names, not the subelement names, should be used on this card.

CARD TYPE: Mortar Target Priority

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'MRTP'	NA	A4	1-4
					5-6
Target Game Name	1	NA	NA	A4	7-10
Target Priority Value (0 km), MRTPR(IT)	1,2	1-9999	NA	I4	11-14
Target Priority Slope, MRTPRS(IT)	1,2	-999 to +9999	Δ per km	I4	15-18
					19-20
Repeat of Columns 7-18					21-24
Repeat of Columns 7-18					25-28
Repeat of Columns 7-18					29-32
Repeat of Columns 7-18					33-36
Repeat of Columns 7-18					37-40
Repeat of Columns 7-18					41-44
Repeat of Columns 7-18					45-48
Repeat of Columns 7-18					49-52
Repeat of Columns 7-18					53-56
Repeat of Columns 7-18					57-60
Repeat of Columns 7-18					61-64
Repeat of Columns 7-18					65-68
Repeat of Columns 7-18					69-72
					73-76
					77-80

NOTE:

1. See text.
2. IT is the ordinal number of the target game name as read by the program.

Figure 3.33 Mortar Target Priority

AMSAA FORM 1, 6 JUN 75

MXO, MYO, MX1, MY1, MX2, MY2, MX3, MY3, MX4, MY4

(Fixed Bias Corrections for Moving Targets)

These cards are used to enter fixed bias corrections for a stationary firer against a moving target. If one or more of these cards are used for a round, then all must be used, even if only to specify zeros for the corrections. These cards are needed only for those rounds for which biases are furnished to the AMSWAG user. These cards are:

a. MXO - Horizontal corrections for targets moving 2 kilometers per hour

b. MYO - Vertical corrections for targets moving 2 kilometers per hour

c. MX1, MX2, MX3, MX4 - Horizontal corrections for targets moving 10, 20, 30 and 40 kilometers per hour, respectively.

d. MY1, MY2, MY3, MY4 - Vertical corrections for targets moving 10, 20, 30 and 40 kilometers per hour, respectively.

The range interval used is that used for this round in its constant data. These corrections are algebraically added to the stationary-stationary biases given on the DXO, DYO, DXH, DYH, DXM and DYM cards.

NOTE: The 'O' in MXO and MYO is a numeric character.

CARD TYPE: Fixed Bias Corrections for Moving Targets CARD SEQUENCE: See Section 2 NO. CARDS THIS TYPE: See text

ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
1	Card Title		As Approp	NA	A3	1-3
2	Round Game Name		NA	NA	A4	4-7
3	Bias Correction for Range 1, SMBASX or SMBASY	1,2	-9999 to 99999	Hundredths of Mils	I5	8-12
4	Bias Correction for Range 2, SMBASX or SMBASY	1,2	-9999 to 99999	Hundredths of Mils	I5	13-17
.	.	.	.	.	.	18-22
.	.	.	.	.	.	23-27
.	.	.	.	.	.	28-32
.	.	.	.	.	.	33-37
5	Bias Correction for Range 7, SMBASX or SMBASY	1,2	-9999 to 99999	Hundredths of Mils	I5	38-42

NOTE:
1. See text
2. SMBASX or SMBASY is an array indexed on range increment, first or subsequent round fired, and ordinal number of the round game name as read by the program.

Figure 3.34 Fixed Bias Corrections for Moving Targets

MXAQ (Maximum Range to Acquire)

This card specifies the maximum range within which a weapon or squad is allowed to acquire targets. The actual maximum range used in the model is the minimum of this range and a similar range from the target acquisition data base. The default value for the range is 9999 meters.

CARD TYPE: Maximum Range to Acquire

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'MXAQ'	NA	A4	1-4
					5-6
Weapon Squad) Game Name		NA	NA	A4	7-10
					11-12
Maximum Range Allowed to Acquire Targets, MXRGAQ(IW)	1,2	0-9999	Meters	I4	13-16

NOTE:

1. See Text
2. IW is the ordinal number of the game weapon name as read by the program.

Figure 3.35 Maximum Range to Acquire

AMSAA FORM 1, 6 JUN 75

OUT2 (Optional Duplicate End-of-Game Summary)

The use of this card prints a second end-of-game summary.

CARD TYPE: Optional Duplicate End-of-Game Summary

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 0 or 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Type	1	'OUT2'	NA	A4	1-4

NOTE:

1. Use of this card prints a second copy of the end of game unit statuses, ammo statuses, and victim-killer scoreboards.

Figure 3.36 Optional Duplicate End-of-Game Summary

AMSAA FORM 1, 6 JUN 75

P(A) (Probability of Availability)

This card provides two items of information for certain rounds. The first item is the probability of availability. Currently, this value should be entered as 1.0 (1000 on the card). The second item is the time for initial lay of the weapon which fires the round. This card is only needed for those rounds which have lethality data stored as expected time to kill (or rate of kill).

CARD TYPE: Probability of Availability

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: 1 Per Round (See Text)

COL	ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4	Card Title		'P(A)'	NA	A4
5-6					
7-10	Round Game Name	1	NA	NA	A4
11-12					
13-16	Probability of Availability, AVAIL(IR)	2,4	1000	Thousandths	I4
17-20	Time for Initial Lay, TINLAY(IR)	3,4	0-9999	Tenths of Seconds	I4
21-80					

NOTE:

1. See text for rounds which need this card.
2. Always use 1000.
3. See text.
4. IR is the ordinal number of the round game name as read by the program.

Figure 3.37 Probability of Availability

AMSAA FORM 1, 6 JUN 75

PERS (Personnel)

This card is used to specify the crew size for each weapon system in a case. These values are used in computing the number of personnel on each side during a battle. A PERS card is needed for both the attacking and defending squad types, but not for the squad sub-elements.

CARD TYPE: Personnel

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: 1 Per Weapon Type pr Squad Type

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'PERS'	NA	A4	1-4
					5-6
Weapon (Squad) Game name		NA	NA	A4	7-10
					11-12
Crew Size, PERSOL(IW)		0-9999	Tenths of Seconds	I4	13-16
					17-80

NOTE:
1. For a squad, the crew size is the number of persons in the squad.
2. IW is the ordinal number of the weapon (squad) game name as read by the program.

Figure 3.38 Personnel

AMSAA FORM 1, 6 JUN 75

PLOT (Plot Option)

This card arranges for a plot of the attacker's and defender's location to be drawn at a specified time interval throughout the battle. Additionally, a plot is drawn at the end-of-game time even if it is not a multiple of the specified interval. If no interval is specified, then 120 seconds is used. The interval must be a multiple of 10 seconds.

CARD TYPE: Plot Option CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'PLOT'	NA	A4	1-4
					5-6
Plot Interval, IPLOT	1	10-9990	Seconds	I4	7-10

NOTE: 1. See text.

Figure 3.39 Plot Option

AMSAA FORM 1, 6 JUN 75

PPBS (Pinpoint Burst Size)

The probability of acquisition of a weapon system as the result of a firing event differs depending on the caliber of type of ammunition fired. Since the firing acquisition data base for a weapon system is based on only one type of round, an adjustment is possibly necessary if a different type of round is used. This card specifies the number of rounds of another type that need to be fired to give the same probability of the weapon system being acquired. If no PPBS card is used for a round, the value is set to 1.0.

CARD TYPE: Pinpoint Burst Size

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: 0 or 1 per round type

COL	FORMAT	UNITS	LIMITS	NOTE	ITEM DESCRIPTION
1-4	A4	NA	'PPBS'		Card Title
5-6					
7-10	A4	NA	NA		Round Game Name
11-12					
13-16	F4.2	Rounds	0-9999.	1,2	Number of Rounds, PPBS(IR)
17-80					

NOTE:

1. See text
2. IR is the ordinal number of the round game name as read by the program.

Figure 3.40 Pinpoint Burst Size

AMSAA FORM 1, 6 JUN 75

PPN (Pinpoint (Firing) Target Acquisition Data)

This card is used to enter the pinpoint (firing) target acquisition data for a case. The data consist of probabilities of ultimate detection of a weapon that has fired. The data on the PPN card is for the stationary looker versus the stationary lookee situation only. Motion conditions and concealment are entered using the PFAC card.

CARD TYPE: Pinpoint (Firing) Target Acquisition Data

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: As Required Per Looker-Lookee Combination

ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
1	Card Type		'PPX '	NA	A4	1-4
2	Blank				2X	5-6
3	Looker Type			NA	A4	7-10
4	Blank				2X	11-12
5	Lookee Type			NA	A4	13-16
6	Blank				2X	17-18
7	Data Set	1	1 OR 2	NA	I1	19
8	Blank				2X	20-21
9	Data for Range 0 M	2	0-1000	Thousandths	I4	22-25
10	Blank				2X	26-27
11	Data for Range 500 M	2	0-1000	Thousandths	I4	28-31
12	Blank				2X	32-33
.	.	.	.	.	.	34-68
13	Data for Range 4000 M	2	0-1000	Thousandths	I4	69-72
14	Blank				7X	73-79, -9, 80

NOTE:

1. Two complete sets of target acquisition data may be input. The program will start using the second set when certain input conditions are met (TILL card).
2. Probability of being acquired by firing signature (X 1000).

Figure 3.41 Pinpoint (Firing) Target Acquistion Data

PREP (Time for Preparatory Fires)

This input specifies the length of time the preparatory fires phase of the battle will last. During this phase, all artillery and mortar assets of both sides fire only at preplanned targets (see ATAT and DFAT cards). After this phase, the artillery and mortar assets are distributed among targets acquired by artillery/mortar observers proportional to the priority of the targets (see MRTP and ARTP cards).

If a PREP card is not in the input deck, the time for preparatory fires is defaulted to 0 seconds.

CARD TYPE: Time for Preparatory Fires CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1

COL	1 2 3 4	5 6	7 8 9 10	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
FORMAT	A4		I4	
UNITS	NA		Seconds	
LIMITS	'PREP'		0-9999	
NOTE			1	
ITEM DESCRIPTION	Card Title		Preparatory Time, PREPT	

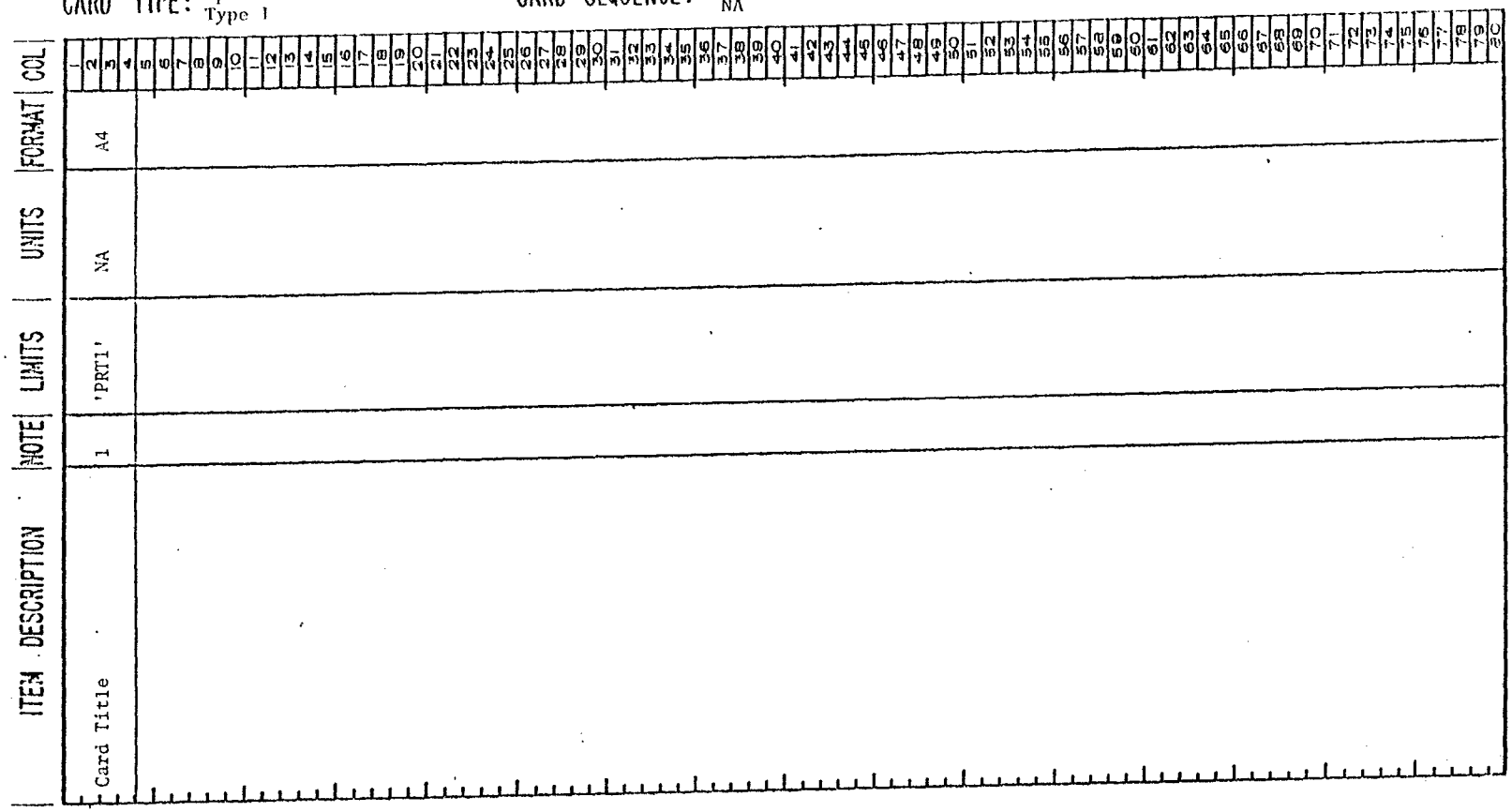
NOTE: 1. See Text.

Figure 3.42 Time for Preparatory Fires

PRT1 (Optional Printout, Type 1)

The use of this card causes a summary of game names, constant data names, and lethality/vulnerability names for the first 14 weapons and rounds, kill criteria, availability and types of lethality data to be printed. This option is normally used for debugging. The printout occurs immediately after the echo of the PRT1 card.

CARD TYPE: Optional Printout, Type 1 CARD SEQUENCE: NA NO. CARDS THIS TYPE: As Needed



NOTE: 1. Normally used for debugging. See Text.

Figure 3.43 Optional Printout, Type 1

AMSAA FORM 1, 6 JUN 75

PRT2 (Optional Printout, Type 2)

The use of this card causes a summary of the round choices for each firer-target pair specified on an EXCP card to be printed. This printout occurs once automatically after the TABF card is read. This gives a useful summary of the EXCP information. Additional requests for this printout are normally used for debugging. The printout occurs immediately after the echo of the PRT2 card.

CARD TYPE: Optional Printout, Type 2 CARD SEQUENCE: See Text NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	1	'PRT2'	NA	A4	1-4

NOTE: 1. Normally used for debugging. See Text.

Figure 3.44 Optional Printout, Type 2

AMSAA FORM 1, 6 JUN 75

PRT3 (Optional Printout, Type 3)

The use of this card causes a printout of the joint table to occur. This printout occurs once automatically after the TABF card is read. The joint table is a useful summary of the lethality/vulnerability names given on the WPN and EXCV cards. Additional requests for this printout are normally used for debugging. If a PRT3 card appears after the TABF card, then the joint table no longer contains the lethality/vulnerability names, but the addresses in the COREIW array in which the lethality/vulnerability data is now stored. The printout occurs immediately after the echo of the PRT3 card.

CARD TYPE: Optional Printout, Type 3 CARD SEQUENCE: See Text NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	1	'PRT3'	NA	A4	1-4

NOTE: 1. Normally used for debugging. See Text.

Figure 3.45 Optional Printout, Type 3

AMSAA FORM 1, 6 JUN 75

PRT4 (Optional Printout, Type 4)

The use of this card causes a summary printout of game names, constant data names, vulnerability names, kill criteria, and the addresses of the COREIW array in which the constant data are stored. These data are printed for all weapons in this case. This option is normally used for debugging. The printout occurs immediately after the echo of the PRT4 card.

CARD TYPE: Optional Printout, Type 4 CARD SEQUENCE: See Text NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	1	'PRT4'	NA	A4	1-4

NOTE: 1. Normally used for debugging. See text.

Figure 3.46 Optional Printout, Type 4

AMSAA FORM 1, 6 JUN 75

PRT5 (Optional Printout, Type 5)

The use of this card causes a summary printout of game names, constant data names, lethality names, lethality type, probability of availability, the addresses of the COREIW array in which the constant data arestored and whether or not rounds have fixed biases. These data are printed for all rounds in this case. This option is normally used for debugging. The printout occurs immediately after the echo of the PRT5 card.

CARD TYPE: Optional Printout, Type 5 CARD SEQUENCE: See Text NO. CARDS THIS TYPE: As Desired

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	1	'PRTS'	NA	A4	1-4

NOTE: 1. Normally used for debugging. See Text.

Figure 3.47 Optional Printout, Type 5

AMSAA FORM 1, 6 JUN 75

QUIT

This card specifies a game time at which the execution of the case will cease. The time can be used for debugging model purposes, limitation of computer usage, or the termination of cases in which the end of game criterion is not casualty dependent.

CARD TYPE: Time of Battle Termination

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: NA

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'QUIT'	NA	A4	1-4
					5-6
Battle Termination Time, TQUIT		0-9999.	Seconds	F5.0	7-11
					12-80

NOTE:

Figure 3.48 Time of Battle Termination

RELD (Reload)

This card specifies a round type for which the associated weapon system, after a certain number of rounds have been expended, requires a reload time. The weapon system fires at a constant rate until this number of rounds is expended. An example is a two launcher TOW. After these two rounds are fired, the launcher must be reloaded before any more rounds can be fired. The RELD card also specifies the reload time and the number of rounds fired between reloads.

CARD TYPE: Reload

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'RELD'	NA	A4	1-4
					5-6
Round Game Name		NA	NA	A4	7-10
Rounds Between Reloads, RLEXP(IR)	1,2	1-9999	Rounds	I4	11-14
Reload Time, RLTIME(IR)	1,2	1-9999	Seconds	I3	15-17

NOTE:

1. See Text.
2. IR is the ordinal number of the round game name as read by the program.

Figure 3.49 Reload

AMSAA FORM 1, 6 JUN 75

RLOS (Reload Line-of-Sight Option)

If the reload option for a round type is being used (see RELD card), then this card may be used to indicate that the associated weapon becomes fully covered while in a reloading status. Otherwise, the exposure of the weapon is unaffected.

CARD TYPE: Reload Line-of-Sight Option

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Needed

COL	1 2 3 4	5	6 7 8 9 10	11 ... 80
FORMAT	A4		A4	
UNITS	NA		NA	
LIMITS	'RLOS'		NA	
NOTE			1	
ITEM DESCRIPTION	Card Title		Weapon Game Name	

NOTE: 1. See Text.

Figure 3.50 Reload Line-of-Sight Option

SDIE (Squad Die Logic)

This card specifies that all the subelements of a squad are attrited at the same rate.

Without this card the model assumes a priority scheme for subelement attrition. The highest priority subelement is attrited last, the next-to-the-highest priority subelement is attrited next-to-last, and so on.

CARD TYPE: Squad Die Logic

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: 1/Case, Optional

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'SDIE'	NA	A4	1-4

NOTE:

Figure 3.51 Squad Die Logic

AMSAA FORM 1, 6 JUN 75

SQBA (Breakdown of Attacking Squad)

This card specifies the number of each subelement type in a squad and the priority of a subelement within the squad. The priority sequence is used to determine weapon handoff in the model. If a high priority subelement is killed, a lower priority subelement, if available, discards his own weapon and begins using the higher priority weapon. The subelement given a value of one is the highest priority, the subelement given a value of two is the next-to-the-highest priority, and so on.

If the case is a Blue attack, then the number of subelements specified on this card is the number in a fire team.

(See the SQBD card for breakdown of defending squad.)

CARD TYPE: Breakdown of Attacking Squad

CARD SEQUENCE: See Note 1

NO. CARDS THIS TYPE: 1 Per Attacking Squad Subelement

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'SQBA'	NA	A4	1-4
Subelement Game Name	2	NA	NA	A4	7-10
Number of this subelement in squad (fire team), WPNAN(IW)	2,3	.1-10.0	Persons	F4.2	13-16
Priority of this subelement, WPNASP(IW)	2,3	1-9999	NA	I4	19-22

NOTE:
1. This card must immediately follow the SQEA cards. Also, See Section 2.
2. See Text.
3. IW is the ordinal number of the weapon game name (subelement game name) as read by the program.

Figure 3.52 Breakdown of Attacking Squad

AMSAA FORM 1, 6 JUN 75

SQBD (Breakdown of Defending Squad)

This card specifies the number of each subelement type in a squad and the priority of a subelement within the squad. The priority sequence is used to determine weapon handoff in the model. If a high priority subelement is killed, a lower priority subelement, if available, discards his own weapon and begins using the higher priority weapon. The subelement given a value of one is the highest priority, the subelement given a value of two is next-to-the-highest priority, and so on.

(See the SQBA card for breakdown of attacking squad.)

CARD TYPE: Breakdown of Defending Squad

CARD SEQUENCE: See Note 1

NO. CARDS THIS TYPE: 1 Per Defending Squad Subelement

COL	ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4	Card Title		'SQBD'	NA	A4
5-6					
7-10	Subelement Game Name	2	NA	NA	A4
11-12					
13-16	Number of this Subelement in Squad, WPNDN(IW)	2,3	1-10.0	Persons	F4.2
17-18					
19-22	Priority of this subelement, WPNDSP(IW)	2,3	1-9999	NA	I4

NOTE:

1. This card must immediately follow the SQED cards. Also, see Section 2.
2. See Text.
3. IW is the ordinal number of the weapon game name (subelement game name) as read by the program.

Figure 3.53 Breakdown of Defending Squad

SQDA (Attacking Squad)

This card specifies the game name, constant data name, and vulnerability name of the attacking squad. If the constant data name is blank, then the game name is used for the constant data name. If the vulnerability name is blank, then whatever name is used for the constant data name is also used for the vulnerability name. The game name must be specified. No rounds are listed for the squad on this card.

(See the SQDD card for defending squad.)

CARD TYPE: Attacking Squad CARD SEQUENCE: See Note 1 NO. CARDS THIS TYPE: 1

COL	ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4		Card Title		'SQDA'	NA	A4
5-6						
7-10		Squad Game Name, ATTSQD	2	NA	NA	A4
11-14		Squad Constant Data Name	2	NA	NA	A4
15-18		Squad Vulnerability Name	2	NA	NA	A4

NOTE:
1. This card must immediately follow the WPN cards.
2. See text.

Figure 3.54 Attacking Squad

AMSAA FORM 1, 6 JUN 75

SQDD (Defending Squad)

This card specifies the game name, constant data name, and vulnerability name of the defending squad. If the constant data name is blank, then the game name is used for the constant data name. If the vulnerability name is blank, then whatever name is used for the constant data name is also used for the vulnerability name. The game name must be specified. No rounds are listed for the squad on this card.

(See the SQDA card for attacking squad.)

CARD TYPE: Defending Squad CARD SEQUENCE: See Note 1 NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'SQDD'	NA	A4	1-4
					5-6
Squad Game Name, DEFSQD	2	NA	NA	A4	7-10
Squad Constant Data name	2	NA	NA	A4	11-14
Squad Vulnerability Name	2	NA	NA	A4	15-18
					19-80

NOTE:
1. This card must immediately follow the SQBA cards.
2. See Text.

Figure 3.55 Defending Squad.

AMSAA FORM 1, 6 JUN 75

SQEA (Attacking Squad Subelement)

This card specifies the subelements of an attacking squad. One card is required for each subelement. The content and format of the card are the same as that of the WPN card.

(See the SQED card for defending squad subelement.)

CARD TYPE: Attacking Squad Subelement

CARD SEQUENCE: See Note 1

NO. CARDS THIS TYPE: 1 per Attacking Squad Subelement

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	2	'SQEA'	NA	A4	1-80

NOTE:
1. This card must follow the SQDA card.
2. See WPN card for description of contents and format.

Figure 3.56 Attacking Squad Subelement.

AMSAA FORM 1, 6 JUN 75

SQED (Defending Squad Subelement)

This card specifies the subelements of a defending squad. One card is required for each subelement. The content and format of the card are the same as that of the WPN card.

(See the SQEA card for attacking squad subelement).

CARD TYPE: Defending Squad Subelement

CARD SEQUENCE: See Note 1

NO. CARDS THIS TYPE: 1 Per Weapon Squad Subelement

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	2	'SQED'	NA	NA	1-4

NOTE:
1. This card must follow the SQDD card.
2. See WPN card for description of contents and format.

Figure 3.57 Defending Squad Subelement

SQUN (Attacking Squad Units)

This card specifies the unit numbers of the attacker maneuver vehicles that carry mounted squads and the number of squads in each unit. The model allows multiple entries per card or multiple cards with one or more entries. This card is very similar to the UNTA card.

CARD TYPE: Attacking Squad Units

CARD SEQUENCE: See Note 1

NO. CARDS THIS TYPE: 1 or More, as required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'SQUN'	NA	A4	1-4
Attacking Squad Game Name		NA	NA	A4	5-8
Unit Number		1-24	NA	I3	9-11
Number of Mounted Squads, ORIGSQ(IU)	2	1-8	NA	I2	12-13
REPEAT OF COLUMNS 11-15					14-18, 19-23, 24-28, 29-33, 34-38, 39-43, 44-48, 49-53, 54-58, 59-63, 64-68, 69-73, 74-78, 79-80

NOTE:
1. This card must follow the UNTA and UASG cards.
2. IU is the unit number.

Figure 3.58 Attacking Squad Units

AMSAA FORM 1, 6 JUN 75

STRG (Starting Range)

This card specifies a cutoff acquisition range for an attacker unit on an axis and the defender units associated with this axis. The range is defined as the distance between an attacker maneuver unit on an axis and the center of mass of the defender units associated with this axis. Prior to this range, no acquisition is allowed to occur between the attacker unit and any of the same defender units. After this range, if line-of-sight exists, then acquisition normally occurs.

In essence, this card allows the user to play any opening range desired with only one scenario. A separate range may be specified for each axis. If no STRG card is used, the model defaults the starting ranges to 7500 meters.

CARD TYPE: Starting Range CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'STRG'	NA	A4	1-4
Starting Range Axis 1, STRG(1)	1	0-9999	Meters	I4	7-10
Starting Range Axis 2, STRG(2)	1	0-9999	Meters	I4	13-16
Starting Range Axis 3, STRG(3)	1	0-9999	Meters	I4	19-22

NOTE: 1. See Text.

Figure 3.59. Starting Range

AMSAA FORM 1, 6 JUN 75

SUPP (Suppression)

Suppression is played in the model according to the procedure outlined in AMSAA Technical Report Number 169. The inputs to the suppression routine are a human factors coefficient and a mean duration of suppression. These two inputs are provided for each weapon and squad type (not squad subelements) by the use of this card.

CARD TYPE: Suppression CARD SEQUENCE: See Note 1 NO. CARDS THIS TYPE: 1 Per Weapon and Squad Type

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'SUPP'	NA	A4	1-4
Weapon Game Name		NA	NA	A4	7-10
Human Factors Coefficient, RHO		0.01 - 2.00	NA	F6.2	13-18
Mean Duration of Suppression, MU		0.01-9999.9	Seconds	F6.2	21-26

NOTE: 1. Must follow WPN, SQDA, and SQDD cards.

Figure 3.60 Suppression

AMSAA FORM 1, 6 JUN 75

TABF (Mass Storage Search)

After this card is read (and the model assumes that all weapon, squad and lethality/vulnerability cards have been read), all weapon constant data, round constant data, and lethality/vulnerability data requested for this case are read from mass storage and stored in the COREIW array. The model also double checks the data found versus the data requested to insure that nothing has been left out. If any inconsistencies are found, then error prints occur and the model stops prior to executing the case.

CARD TYPE: Mass Storage Search CARD SEQUENCE: See Note 1 NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title	2	'TABF'	NA	A4	1 2 3 4

NOTE:

1. Normally immediately prior to GAME card. However, it is possible to put such cards as PRT1, PRT2, PRT3, PRT4, PRT5, STRG, AOWS, VISL, MFAC, fixed bias cards, TILL, DIST, OUT2, RLOS, SUPP, LOSD, RELD, IDEN, XPRP, XTYP, MXAQ, VULF, FODF, FOAT, AVAL, DVAL, PPBS, CRIT, PERS, GFAC, PLOT, P(A), PREP, SMOK, LPR1, LPR2, MRTP, ARTP, AATS, ATAS, DFAT, ATAT, ARTU, LOAD, DISM, QUIT, TACS, DISW and XRRG between the TABF and GAME cards. However, this is not normally recommended as the model's echo of its input cards is then split up.
2. See text.

Figure 3.61 Mass Storage Search

AMSAA FORM 1, 6 JUN 75

TACS (Tactics)

In the model, an attacker unit's position and velocity record (as a function of game time) is preprocessed. With the application of a tactics input from this card, however, an attacker unit's position and velocity record may be modified to a limited extent. The possible tactics inputs and their description are:

a. 'HALT'; an unconditional halt until another TACS card restarts movement.

b. 'SLOW'; a reduction in movement rate. The rate is $\frac{1}{n}$ times the normal rate where n is an integral input on a TACS card.

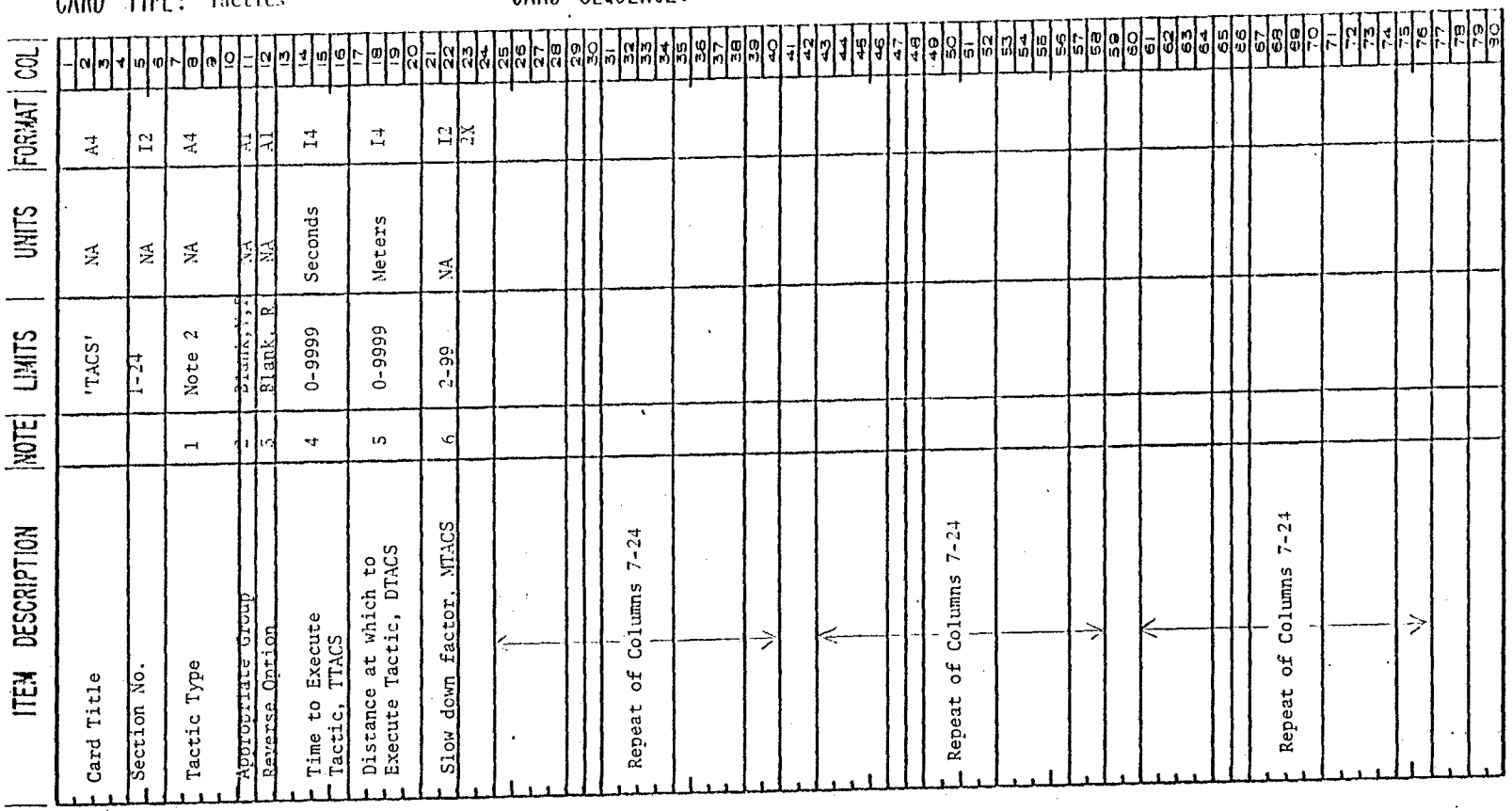
c. 'MOVE'; resumption of normal movement rate. Use to override 'HALT' and 'SLOW'.

d. 'WAIT'; halt for a specified period of time.

Currently, each TACS card applies to one section of a route (two sections per route and twelve routes overall). Further, the card may apply to only the vehicles on a section, only the dismounted squads (personnel) on a section, or both. The execution of a tactic is based on either the range between forces or on actual game time. The user decides which time or range to use. Normally, if the tactic applies to vehicles, then the vehicular force-on-force range is used, and, if the tactic applies to personnel, then the personnel range is used. An exception to this rule is the use of the reverse (R) option. If the reverse option is in effect, the personnel range is used to execute vehicle tactics and vice versa. This reverse option is primarily used to restart vehicle movement when the dismounted squads reach a specified distance from the defenders. Further tactics may be specified on the DISM card.

The model allows multiple entries per card or multiple cards with one or more entries. For example, if three different tactics for a section are to be specified, all three can be put on one card or one each on three cards or one on one card and two on another card. A total of ten tactics are allowed per section.

CARD TYPE: Tactics CARD SEQUENCE: NA NO. CARDS THIS TYPE: As Needed



ITEM	DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
1	Card Title		'TACS'	NA	A4	1-4
2	Section No.		1-24	NA	I2	5-6
3	Tactic Type	1	Note 2	NA	A4	7-10
4	Appropriate Group	2	Blank, 1, 2	NA	A1	11
5	Reverse Option	3	Blank, R	NA	A1	12
6	Time to Execute Tactic, TTACS	4	0-9999	Seconds	I4	13-16
7	Distance at which to Execute Tactic, DTACS	5	0-9999	Meters	I4	17-20
8	Slow down factor, MTACS	6	2-99	NA	I2	21-22
9					2X	23-24
10	Repeat of Columns 7-24					25-48
11	Repeat of Columns 7-24					49-72
12	Repeat of Columns 7-24					73-96

NOTE:

1. 'HALT', 'SLOW', 'MOVE', or 'WAIT' (See text).
2. If blank, then tactic applies to both vehicles and personnel.
3. If blank, then reverse option (see text) is not in effect.
4. Game Time.
5. Distance between forces on this section.
6. See text used for slow option only.

Figure 3.62 Tactics

AMSAA FORM 1, 6 JUN 75

TGTP (Target Priorities for Direct Fire)

This card is used to specify targets and target priorities for each direct fire weapon type including squad subelements. A firer cannot fire at any weapon whose game name is not listed as a target game name for that firer. Targets and priorities are not given for a squad firer, but rather for each type of weapon system within a squad. However, if the squad is a target for some firer, then the squad game name is properly given as one of the target game names for that firer.

For each potential target, a priority value (y-intercept) and a slope (change per kilometer) are given. The priority value is the value of the target at a range of zero kilometers and the slope is the change in that value per kilometer of range between the firer and the target. Normally, the slope is negative so that target worth increases with decreases in range.

For each firer unit, the priority values are used to determine the rankings of a list of targets. AMSAA Technical Report Number 169 provides additional details about target priorities.

The largest priority value allowed by the model is 250 and the slope must be between -125 and +125. However, the combination of the value and slope should not produce a value less than or equal to zero within the range capability of the firer.

The model allows multiple entries per card or multiple cards with one or more entries.

AMSAA FORM 1, 6 JUN 75

CARD TYPE: Target Priorities for Direct Fire

CARD SEQUENCE: See Section 2

NO. CARDS THIS TYPE: As Required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'TGTP'	NA	A4	1-4
Firer Game Name		NA	NA	A4	5-8
					9-10
Target Game Name	1	NA	NA	A4	11-14
Target Priority Value (0 km), ITPRT8	1	1 to 250	NA	I3	15-17
Target Priority Slope, JTPRT8	1	-125 to +125	Δ Per Km	I3	18-20
					21-22
Repeat of Columns 11-20					23-26
					27-30
					31-32
Repeat of Columns 11-20					33-38
					39-42
					43-44
Repeat of Columns 11-20					45-50
					51-54
					55-56
Repeat of Columns 11-20					57-62
					63-66
					67-68
Repeat of Columns 11-20					69-74
					75-76
					77-80

NOTE: 1. See text.

Figure 3.63 Target Priorities for Direct Fire

TILL (Time to Switch to Second Target Acquisition Data Base)

The time on this card specifies when the model will switch from using target acquisition data base 1 to target acquisition data base 2. This card has been added in order to simulate the use of artificial illumination. If this card is not used, the time is defaulted to 10,000 seconds.

CARD TYPE: Time to Switch Acquisition Data Base CARD SEQUENCE: NA NO. CARDS THIS TYPE: 0 or 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'TILL'	NA	A4	1-4
					5-6
Time to Switch Acquisition Data, TILLUM		0-9999	Seconds	I4	7-10

NOTE:

Figure 3.64 Time to Switch Acquisition Data Base

AMSAA FORM 1, 6 JUN 75

UASG (Unit Assignment, Type 2)

This card specifies the unit numbers and the number of weapons in each unit for a weapon game name. For the purpose of this card, a squad is considered as one weapon.

The UASG card and the UNTA card, although they have different formats, serve the same purpose. The UNTA card, though, is easier to use.

The model allows multiple entries per card or multiple cards with one or more entries. If back-to-back entries are for the same weapon game name, then the second and following entries do not need to repeat the name.

(See the UNTA card for unit assignment, type 1).

CARD TYPE: Unit Assignment, Type 2 CARD SEQUENCE: NA NO. CARDS THIS TYPE: As Required

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'UASG'	NA	A4	1-4
					5-8
Unit Number	1	1-164	NA	I5	9-11
Number of Weapons In Unit, ORIG(IU)	2	1-8	NA	I2	12-13
Weapon Game Name		NA	NA	A4	14-17
Repeat of Columns 9-17					18-20
Repeat of Columns 9-17					21-26
Repeat of Columns 9-17					27-29
Repeat of Columns 9-17					30-35
Repeat of Columns 9-17					36-38
Repeat of Columns 9-17					39-40
Repeat of Columns 9-17					41-44
Repeat of Columns 9-17					45-49
Repeat of Columns 9-17					50-54
Repeat of Columns 9-17					55-58
Repeat of Columns 9-17					59-62
Repeat of Columns 9-17					63-67
Repeat of Columns 9-17					68-71
Repeat of Columns 9-17					72-74
Repeat of Columns 9-17					75-76
Repeat of Columns 9-17					77-80

NOTE:
1. See Text for UNIT card.
2. IU is the unit number.

Figure 3.65 Unit Assignment, Type 2

AMSAA FORM 1, 6 JUN 75

UNIT

This card specifies the number of attacking units, the initial defender unit number, and the last defender unit number. The values on this card, with more detail, are:

a. NA - the number of attackers on the unit information file. This is 24 plus the number of attacker overwatch weapons (AOW's). Unit numbers 1 through 24 are always reserved for attacker maneuver weapons (AMW) even though the unit information file may not contain data for all of them. Unit numbers from 25 on up are used for AOW's. No unit numbers are skipped after the AMW units.

b. NB - the unit number for the initial defender ground weapon (DGW) on the unit information file. All other DGW's are numbered consecutively beginning at this unit. The model allows for a total of 160 units and a maximum of 60 DGW's Normally NB is set to 101.

c. NUNITS - the unit number for the highest numbered defender. If NB is 101 and there are 32 DGW's on the unit information file, then NUNITS must be 132.

The unit numbers between NA and NUNITS are allotted for new units that are created during the play of the game.

CARD TYPE: Unit CARD SEQUENCE: NA NO. CARDS THIS TYPE: 1

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'UNIT'	NA	A4	1-4
Number of Attacker Units, NA	1	24-88	NA	I4	5-8
Number of Defender Units, NB	1	25-160	NA	I4	9-12
Number of Units, NUNITS	1	25-160	NA	I4	13-16

NOTE: 1. See text.

Figure 3.66 Unit

AMSAA FORM 1, 6 JUN 75

UNTA (Unit Assignment Card, Type 1)

This card specifies the unit numbers and the number of weapons in each unit for a weapon game name. For the purpose of this card, a squad is considered as one weapon.

The UASG card and the UNTA card, although they have different formats, serve the same purpose. The UNTA card, though, is easier to use.

The model allows multiple entries per card or multiple cards with one or more entries.

(See the UASG card for unit assignment, type 2).

CARD TYPE: Unit Assignment, Type 1

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: As Required.

COL	ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4	Card Title		'UNTA'	NA	A4
5-6					
7-10	Weapon Game Name		NA	NA	A4
11-13	Unit Number	1	1-160	NA	I3
14	Number of Weapons In Unit, ORGAR(IU)		1-8	NA	I2
15-80	Repeat of Columns 11-15				

NOTE:

1. See text for UNIT card.
2. IU is the unit number.

Figure 3.67 Unit Assignment, Type 1

AMSAA FORM 1, 6 JUN 75

VISL (Visual (Non-firing) Target Acquisition Data)

This card is used to enter the visual (non-firing) target acquisition data. The data consist of either probabilities of ultimate detection (P_∞) or mean times to detect ($\overline{t}$), both indexed on range. At a set range, P_∞ and $\overline{t}$ define the scale factor and mean, respectively, of the negative exponential random variable describing acquisition between a firer unit and an element of a target unit:

$$P(\text{a firer unit acquires an element of a target unit} \leq t \text{ seconds})$$

$$= P_\infty \cdot (1 - e^{-t/\overline{t}})$$

The data on the VISL card are for the stationary firer versus the stationary target only. A necessary adjustment for firer and target motion and target concealment is entered by using the MFAC card.

(See the MFAC card visual target acquisition factor.)

CARD TYPE: Visual (Non-Firing) Target Acquisition Data

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: As Required per Looker-Lookee Combination

COL	ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT
1-4	Card Title		'VISL'	NA	A4
5	Data Type	1	'P' or 'T'	NA	A1
6-9	Looker Game Name		NA	NA	A4
10-13					
14-17	Lookee Game Name		NA	NA	A4
18					
19	Exposure	2	'1' or '2'	NA	I1
20					
21					
22	Data Set	3	'1' or '2'	NA	I1
23					
24					
25-28	Data of 0 M	4	a.1-9999 b.0-100	a.Seconds b. Hundred-ths	I4
29					
30					
31-34	Data for 500M	4	a.1-9999 b.0-100	a.Seconds b.Hundred-ths	I4
35					
36					
37					
38					
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73-76	Data for 4000 M	4	a.1-9999 b.0-100	a.Seconds b.Hundred-ths	I4
77					
78					
79					
80					

NOTE:

1. 'P' for probability of ultimate detection (P_∞).
   'T' for mean time to detect ($\bar{t}$) given a detection.
2. '1' for hull defilade. '2' for fully exposed.
3. Two complete sets of target acquisition data may be entered. The program will switch to the second set when certain conditions have been met (See TILL card).
4. If Column 5 is a 'P', the number is between 0.00 and 1.00 and is punched as 0 through 100.
   If Column 5 is a 'T', the number is between 1 and 9999 seconds.

Figure 3.68 Visual (Non-firing) Target Acquisition Data

AMSAA FORM 1, 6 JUN 75

VULF (Vulnerability Factor)

This card enters multiplicative factors to the probability of kill given a hit (PK/H) data for a specified round-target pair. The factors are for the target in both hull-defilade and fully exposed status. If the product is greater than 1.0, then it is set to 1.0.

The purpose of the card is to be able to adjust the PK/H data for a round-target pair without the cumbersome regeneration of a portion of the data base.

CARD TYPE: Vulnerability Factor CARD SEQUENCE: NA NO. CARDS THIS TYPE: As Needed.

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'VULF'	NA	A4	1-4
Round Game Name		NA	NA	A4	7-10
Target Game Name		NA	NA	A4	13-16
Factor for Hull Defilade, VULFAC(IR,IT)	1	0-9.99	NA	F4.3	20-23
Factor for Fully Exposed, VULFAC (IR,IT)	1	0-9.99	NA	F4.3	25-28

NOTE:

1. IR is the ordinal number of the round game name as read by the program.
2. IT is the ordinal number of the target game name as read by the program.

Figure 3.69 Vulnerability Factor

AMSAA FORM 1, 6 JUN 75

WPN (Weapon)

A WPN card is required for each non-squad weapon to specify three types of code names for the weapon and its rounds.

The first code name specified, called the game name, serves as the name by which the weapon or round is referred to on all other input cards and in the model output.

The second code name specified, called the constant data name, is a header name for a set of performance data (weapon or round) to be read from mass storage. In essence, the constant data name references the appropriate data from mass storage.

The third code name, called the lethality (if a round) or vulnerability (if a weapon) name, serves as one or the other half of the header name for a set of kill data to be read from mass storage. As an example, if a round with lethality name 'RRRR' is fired against a target with vulnerability name 'TTTT', then the header name for the kill data is 'RRRRTTTT'. More details on lethality/vulnerability data can be found in the description of the EXCV card.

The flags on the WPN card specify whether or not the lethality data for a round is stored as probabilities of kill given a hit or as expected times to kill (or rate of kill). Normally large caliber kinetic energy rounds and high explosive antitank rounds are the first type of data and regular high explosive rounds and rounds for rapid fire systems are the second type.

If a constant data name is not specified for a weapon or round, then the game name is used as the constant data name. If no lethality/vulnerability name is specified, then whatever name is used as the constant data name is also used as the lethality/vulnerability name. The game name is always required for the weapon and any rounds it may have.

CARD TYPE: Weapon CARD SEQUENCE: NA NO. CARDS THIS TYPE: One per Non-Squad Weapons Platform

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'WPN'	NA	A4	1-4
					5-6
Weapon Game Name		NA	NA	A4	7-10
Weapon Constant Data Name, WPNIN		NA	NA	A4	11-14
Weapon Vulnerability Name, JINTGT		NA	NA	A4	15-18
					19-20
Round 1 Game Name	1	NA	NA	A4	21-24
Round 2 Game Name	1	NA	NA	A4	25-28
Round 3 Game Name	1	NA	NA	A4	29-32
Round 4 Game Name	1	NA	NA	A4	33-36
					37-38
Round 1 Constant Data Name, RNDIN(IR)	3	NA	NA	A4	39-42
Round 2 Constant Data Name, RNDIN(IR)	3	NA	NA	A4	43-46
Round 3 Constant Data Name, RNDIN(IR)	3	NA	NA	A4	47-50
Round 4 Constant Data Name, RNDIN(IR)	3	NA	NA	A4	51-54
					55-56
Round 1 Lethality Name, JINRND(IR)	3	NA	NA	A4	57-60
Round 2 Lethality Name, JINRND(IR)	3	NA	NA	A4	61-64
Round 3 Lethality Name, JINRND(IR)	3	NA	NA	A4	65-68
Round 4 Lethality Name, JINRND(IR)	3	NA	NA	A4	69-72
					73-74
Round 1 FLAG, BUSH	2	'0' or '1'	NA	I1	75
Round 2 FLAG, BUSH	2	'0' or '1'	NA	I1	76
Round 3 FLAG, BUSH	2	'0' or '1'	NA	I1	77
Round 4 FLAG, BUSH	2	'0' or '1'	NA	I1	78
					79-80

NOTE:

1. Each weapon (weapon platform) may fire up to four different rounds.
2. A zero means that the lethality data for this round is stored as probabilities of kill given a hit. A one means that it is stored as expected times to kill.
3. IR is the ordinal number of the round game name as read by the program.

Figure 3.70 Weapon

AMSAA FORM 1, 6 JUN 75

XPRP (External Preparatory Fires)

This card specifies the losses suffered during artillery preparatory fires calculated externally to the AMSWAG model. The results of external preparatory fires are entered as the fractional losses of the unit for each appropriate kill criterion (see KILL card). The model allows multiple entries per card or multiple cards with one or more entries.

Fractional loss entries are by vehicles rather than unit.

CARD TYPE: External Preparatory Fires

CARD SEQUENCE: NA

NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'XPRP'	NA	A4	1-4
					5-6
Unit Number		1-160	NA	I3	7-9
Fractional F/P Losses, EXFRCT(IU,1)	1,2	0-1.00	NA	F4.2	10-13
Fractional M Losses, EXFRCT(IU,2)	1,2	0-1.00	NA	F4.2	14-17
Fractional M and F Losses, EXFRCT(IU,3)	1,2	0-1.00	NA	F4.2	18-21
Fractional EC losses, EXFRCT(IU,4)	1,2	0-1.00	NA	F4.2	22-25
					26-27
Unit Number		1-160	NA	I3	28-30
Fractional F/P Losses, EXFRCT(IU,1)	1,2	0-1.00	NA	F4.2	31-34
Fractional M Losses, EXFRCT(IU,2)	1,2	0-1.00	NA	F4.2	35-38
Fractional M and F Losses, EXFRCT(IU,3)	1,2	0-1.00	NA	F4.2	39-42
Fractional EC Losses, EXFRCT(IU,4)	1,2	0-1.00	NA	F4.2	43-46
					47-48
Unit Number	1,2	1-160	NA	I3	49-51
Fractional F/P Losses, EXFRCT(IU,1)	1,2	0-1.00	NA	F4.2	52-55
Fractional M Losses, EXFRCT(IU,2)	1,2	0-1.00	NA	F4.2	56-59
Fractional M and F Losses, EXFRCT(IU,3)	1,2	0-1.00	NA	F4.2	60-63
Fractional EC Losses, EXFRCT(IU,4)	1,2	0-1.00	NA	F4.2	64-67
					68-80

NOTE:

1. See Text.
2. IU is the unit number.

Figure 3.71 External Preparatory Fires

AMSAA FORM 1, 6 JUN 75

XRRG (Crossover Range)

This card specifies, for each firer, a crossover range for short and long range round choice. The default value for the crossover range is 1250 meters. Below the crossover range, the round choice for short range is used; above the range, the round choice for long range is used. In practice, the card is seldom used because it defines, for each firer, one crossover range for all targets. A selective crossover range for specific targets may be input by use of the EXCP card.

(See the EXCP card round choice.)

CARD TYPE: Crossover Range CARD SEQUENCE: See Note 1 NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'XRRG'	NA	A4	1-4
					5-6
Firer Game Name	1	NA	NA	A4	7-10
					11-12
Crossover Range, XOVR(IF,IR)	2,3,4	0-9999	Meters	I4	13-16

NOTE:

1. This card must follow the WPN, UNTA, and EXCP cards. Also, see Section 2.
2. The specified crossover range will be applied to the round choices against all targets for this firer. Crossover range is defined to be the break between short and long range with respect to round choices.
3. IF is the ordinal number of the firer game name as read by the program.
4. IR is the ordinal number of the round game name as read by the program.

Figure 3.72 Crossover Range

AMSAA FORM 1, 6 JUN 75

XTYP (External Type)

This card specifies the game names of all weapon and squad types for which external preparatory fire data are being entered (see XPRP card). The model allows multiple entries per card or multiple cards with one or more entries.

CARD TYPE: External Type CARD SEQUENCE: NA NO. CARDS THIS TYPE: As Needed

ITEM DESCRIPTION	NOTE	LIMITS	UNITS	FORMAT	COL
Card Title		'XTYP'	NA	A4	1-4
External Type	1	NA	NA	A4	7-10
Repeat of Columns 7-10					11-14

NOTE: 1. See text.

Figure 3.73 External Type

AMSAA FORM 1, 6 JUN 75

4. OUTPUT

This section provides the user with a description of the primary outputs of the AMSWAG model. Much of the section is a duplication or only a slight rewriting of OUTPUT FORMATS, Appendix III, TRASANA COMBAT MODEL (TRACOM) USER MANUAL, TRASANA Internal Memorandum 14-75, US Army TRADOC SYSTEMS ANALYSIS ACTIVITY, White Sands Missile Range, NM, October 1975.

4.1 Firing Event Summaries

The first section of output is the summary of firing events.

An example is shown in the top third of Figure 4.1, beginning with the heading 'SIGNIFICANT FIRING EVENTS FOR THIS INTERVAL'. In Table 4.1 the column headings are defined and some of the data are further explained.

TABLE 4.1

a. FIRER - There are two columns below FIRER giving the unit number and the game name of the FIRER respectively.

b. TARGET - There are two columns below TARGET giving the unit number and the game name of the TARGET.

c. ROUND - Game round name of round being fired

d. RANGE - The distance in meters between the firer and the target, computed in the subroutine RDCHOS.

e. AMMORT - The rate at which ammo is being expended by the firer in rounds per second, computed in the subroutine RATE.

f. NO - The number of weapons actually firing at the current target.

g. ALPHA - Attrition Rate. The rate that firing weapons are killing the target weapons. For multiple kill targets, ALPHA is the attrition rate for firepower only kills. It is 1/(time to kill).

h. F - The fraction of the unit doing the firing.

i. TC - Time to kill in seconds. If the time to kill exceeds the width of the character field, asterisks (*******) are printed. In the case of a burst fire weapon, time to kill data is simply read from input; such data is flagged by being printed out as 0.

j. ZF/P - The actual number killed in the target unit, either firepower or personnel.

k. BETA - The attrition rate for mobility only kills. See definition of ALPHA.

l. F - Same as above.

m. TC - Same as above.

n. ZM - The actual number of mobility kills in the target unit.

o. GAMMA - The attrition rate for mobility and firepower kills. See ALPHA.

p. F - Same as above.

q. TC - Same as above.

r. ZMF - The actual number of mobility and firepower kills in the target unit.

s. DELTA - The attrition rate for expected casualty kills. See definition of ALPHA.

t. F - Same as above.

u. TC - Same as above.

v. ZEC - The actual number of expected casualty kills in the target unit.

As an example of the data, consider the first horizontal line under the column headings. Firer unit 101, with game name 1500, fired a round, with game name 9101, against target unit number 6, with game name 1350. The range between firer and target was 2499 meters. The ammunition rate of expenditure (calculated from a firepower time to kill) was .060 rounds/sec. Out of a total number of .605 firers allocated to the target, fifty percent was firepower only allocation (i.e., against the surviving firepower only portion of the target). The entry for firepower only time to kill was 1433 seconds and for firepower only attrition, .00 (rounded to two decimal places). The remaining entries on the line apply to mobility only kills and mobility and firepower kills in a similar manner.

4.2 Minefield Event Summaries

An example of a minefield event is displayed on the middle third of Figure 4.1. In Table 4.2, the column headings are defined.

TABLE 4.2

a. UNIT - Attacker unit number.

b. MFLD - Minefield number.

c. DENSITY - Density of mines (expected number of mines encountered in the last ten second period).

d. CRSR (MF) - Number of mobility and firepower vehicles.

e. CRSR (M) - Number of mobility only vehicles.

f. F-KILLS - Number of firepower only kills to mobility and firepower vehicles.

g. M-KILLS (MF) - Number of mobility only kills to mobility and firepower vehicles.

h. MF-KILLS - Number of mobility and firepower kills to mobility and firepower vehicles.

i. MOF-KILLS - Sum of firepower only, mobility only, and mobility and firepower kills to mobility and firepower vehicles.

j. M-KILLS (M) - Number of mobility kills to mobility only vehicles.

Consider the first data line from the minefield event example. Attacker unit number 9 encountered a density of .2626 mines of minefield number 1 within the last ten second game period. Out of 1.940 vehicles with both mobility and firepower there were:

.5195E-02 firepower only kills

.2454E-00 mobility only kills

.5195E-02 mobility and firepower kills

4.3 Dismount Event Summaries. If a dismount of personnel from armored personnel carriers (APC's) on a given axis is to occur, it is printed following the current firing and minefield event summaries. See bottom third of Figure 4.1for example. Here unit number 18 dismounts 35.45 men into unit 41. The dismount is for all APC units on axis 3. However, in the case of this example, unit 18 is the only APC on axis 3. For a given attacker maneuver unit number K($1 \leq K \leq 24$) the axis may be obtained from the following integer division:

$$\text{Axis} = \frac{K+7}{8}$$

Unit number 41 is created to contain the dismounting squads. The new unit number is chosen as the next number higher than the current highest attacker unit number. An additional consecutive unit number is created (in this case 42, see Figure 4.3) to contain the lowest priority squad subelement if this corresponds to the type specified on the LEFT card. This unit is left behind at the coordinates at which the dismount took place. The number of men dismounted (35.45 in example) is obtained from the current value for dismounted infantry in the dismounting unit times a FACTOR of 2 for a BLUE attack (1 otherwise), times the total number of squad weapons obtained from the SQBA cards. In the last four lines, the bit setting of the variable JKEYPV indicates that unit number 18 has dismounted.

4.4 Mobility Information Prints. Mobility information about attacker units is displayed in the three groupings of lines as shown in the top half of Figure 4.2. In particular, for each unit, the movement status (normal movement, slowdown, or halt), delay factor, number of time periods before next reading of information, and the number of the unit information file record containing the proper mobility information is given. The information is helpful, especially if the mobility records have been modified by the application of tactics inputs. The first grouping of lines (see label 1) reflect the movement status, record number, and control variables for reading data of units from the previous time step. The next grouping of lines (see label 2) is the set of first three words of the unit information file record for each time record needed in this period. The next grouping of lines (see label 3) offer information similar to that from the first grouping, but at the current time step.

The first line of data for the group with label 1,

3 -2 3 3

24 entries

displays the movement status of the vehicles of units 1 through 24. The second line of data displays similar information on the dismounted personnel of units 1 through 24. The code numbers and their description are as follows:

-2	unit is slowed down
-1	unit is halted
0	no units on this section or, in the case of personnel, personnel have not yet dismounted from their vehicles
1	unit is to be halted at the next time step
2	unit is to be slowed down at the next time step
3	unit is moving normally
4	unit is to wait

Thus, the vehicles of unit 1 are moving normally, vehicles of unit 2 are slowed down, and so on.

The third through the sixth lines of data display the number of the unit information record used during the last time period. The third and fourth lines display this information for the vehicles, the fifth and sixth lines for personnel. Thus, the first entry of line 3, 183, is the appropriate record number during the last time period for the vehicles of unit number 1.

The ninth and tenth lines are a wasted print.

The last two lines for the group with label 1 display a slow-down factor for each attacker unit (from the TACS card). The next to the last line is for vehicles, the last line for personnel. Thus, the second entry from the left on the next-to-the-last line, 2, indicates that the unit information file of the vehicles of unit 2 is to be read every other time step.

The seventh and eighth lines display an external control variable for the reading of the unit information file for each attacker unit. If the control variable is one less than the corresponding slow-down factor entry in the last two lines, then the unit information file for the unit number is read next time step.

4.5 Minefield Information. An example of a minefield information print is given in the bottom half of Figure 4.2. In Table 4.3, the column headings are defined.

TABLE 4.3

a. UNIT - Attacker unit number.

b. MFN - Minefield number.

c. DENSITY - Expected number of mines to be encountered in the next ten second period.

d. TIME - Time of the unit information file used for minefield information.

e. MCOUNT - If a unit has been delayed, number of times information for this period has been used. Otherwise, it equals one.

4.6 Force-on-Force and Force-on-Squad Ranges. In this discussion on ranges, reference is made to the top third of Figure 4.3. The first three numbers after the label 'FOF/FOS RANGES =' are the distances in meters between the frontmost attacker vehicle units and the frontmost

defender unit for each of the three axes respectively. The next three numbers are the distances between the frontmost attacker squad unit and the frontmost defender unit for each axis. The number after the label 'AVG RG =' is the average range for all the active axes. The average range is computed as:

$$\frac{\sum_{AI} R(AI)}{NA}$$

where:

R(AI) = minimum [force-on-force (FOF) range, force-on-squad (FOS) range] for active axis AI

NA = number of active axes

4.7 Attacker and Defender Participants Summary. As shown in the middle third of Figure 4.3, the first four lines giving attacker and defender non-participating vehicles and personnel are self-explanatory. The next line gives the vehicle exchange ratio (VXR) - sum of red vehicle casualties divided by sum of blue vehicle casualties, and the vehicle force ratio (VFR) - sum of attacker vehicle survivors divided by sum of defender vehicle survivors.

4.8 Non-Participating Unit Summaries. The next section, recognized by a series of X-X-X-X preceding and following it, is a summary of non-participating units. An example is depicted in the bottom third of Figure 4.3.

If all units are still active, the heading "*NO-NON PARTICIPATING UNITS*" appears. Otherwise, the inactive units appear after heading "SUMMARY OF NON-PARTICIPATING UNITS". A non-participating unit is a unit which has lost its firepower or ammunition or, in the case of an armored personnel carrier, its squad. On the next line, if a unit has become ineffective because of no ammunition or no firers, its unit number appears after the row heading "FIREPOWER COWARDS." Otherwise, the row heading "NO FIREPOWER COWARDS" appears. On the following line, if a unit's mobility has become ineffective because of no firepower, ammunition, or personnel, its unit number appears after the row heading "MOBILITY COWARDS." Otherwise, the row heading "NO MOBILITY COWARDS" appears. Finally, the inactive units are printed out by side and weapon type.

In the example, units 145, 157, and 20 are non-participating units; units 145 and 157 have lost their firepower or ammunition; no units have become mobility ineffective; and .4 of weapon type 3312 is inactive.

4.9 Unit Summary. Figure 4.4 depicts a unit summary. The unit numbers are across the top. Units numbered 1-24 are attacker maneuver weapons. Unit numbers between 25 and 100 (not shown here) are either attacker overwatch units or attacker units created by the dismount of an attacker maneuver unit or by the "deposti" of a mobility kill to an attacker maneuver unit. Units numbered 101 and above in this figure are defender units. Following the unit number are TYPE - which is game weapon name, SURV - which is survivors that can fire, SFULL - which is survivors that can both move and fire, STUCK - which is survivors that can only fire, SILENT - which is survivors that only move, and GRUNTS - which is squads in APC'S. Next is FSUP - which is the fraction of the unit that is suppressed. Below FSUP are R1 LEFT through R4 LEFT, the number of rounds left of each round type in the round order specified in the (input) WPN card. The variable X gives the x-coordinate of the unit. Motion of the attacker is in the negative X direction; hence the x-axis velocity component VX, given in 20ths of meters, are always negative for the attacker. SLIME gives the unit number from which this unit is derived due to deposits of mobility killed.

4.10 Squad Summary. Following the unit summary, a summary of squads appears. See the top half of Figure 4.5. The squad unit numbers, beginning with attacker squads, are listed in a column at the left. The squad firing platform types are listed across the top with the associated round types; the current number of weapons and rounds remaining are listed below them. The firing platform types are listed from left to right according to their replacement priorities listed within the squad. The highest priority platform is at left. Attrition is always inflicted on the lowest priority platform first.

4.11 Ammunition Summary. A summary of ammunition is given in the bottom half of Figure 4.5. Below each round type is listed the number of rounds of that type thus far expended, AMOEXP; the number of rounds destroyed, AMONA; and the number of rounds left, AMOLEF.

4.12 Killer-Victim Scoreboard. The last section of output is called the killer-victim scoreboard. This section consists of two tables shown within Figure 4.6. The first table, in the left hand column, displays the defender weapon types as "victims" and across the top displays the attacker weapon types as "killers". The second table has the role of attacker and defender reversed. The entries in the table under the particular weapon type are the number of kills sustained by the victim in the row due to the killer in that column. The SURV column contains survivors of the weapon type associated with that row that can fire. For multiple kill weapon types, rows for M-only kills, M and F kills, and EC kills are also provided. In this case, the first row with the weapon type serves as the F-only kills row. After all the kills for a row plus the survivors are subtracted from the original number for

that victim weapon type, then the remainder of the kills are attributed to artillery and placed under the column headed ARTY.

FIRING EVENT SUMMARIES

Significant Firing Events For This Interval

Firer			Target	Round	Range	Ammort	No.	ALPHA	F	TC	ZF/P	BETA	F	TC	ZM	GAMMA	F	TC	ZMF	DELTA	F	TC	ZEC
101	1500	6	1350	9101	2499.	.060	.605	.001	.50	1433.	.00	-.000	.40******		-.00	.007	.25	144.	.02				
102	1500	6	1350	9101	2529.	.059	.613	.001	.50	1442.	.00	.000	.40******		.00	.007	.25	147.	.02				
103	1500	6	1350	9101	2696.	.059	.630	.001	.51	1501.	.00					.006	.25	165.	.01				
108	7300	6	1350	9701	2866.	.032	.591	.001	.47	909.	.00					.012	.23	86.	.03				
109	7300	6	1350	9701	2639.	.032	.599	.001	.50	839.	.01	.000	.40******		.00	.012	.25	80.	.03				
110	7300	6	1350	9701	2480.	.035	.553	.001	.45	800.	.01					.013	.23	77.	.03				
111	7300	18	3350	9701	2380.	.033	.063	0.000	.07*******		0.00	.00	.0716888.		.00	.019	.07	52.	.01	.009	.07	106.	.01
111	7300	6	1350	9701	2338.	.035	.198	.001	.17	779.	.00					.013	.10	75.	.01				
111	7300	17	1350	9701	2339.	.033	.083	.002	.09	592.	.00	.001	.08	1346.	.00	.018	.08	57.	.01				

MINEFIELD EVENT SUMMARIES

UNIT	MFLD	DENSITY	CRSR(MF)	CRSR(M)	F-KILLS	M-KILLS(MF)	MF-KILLS	MOF-KILLS	M-KILLS(M)
9	1	.2626E+00	1.940	0.000	.5195E-02	.2454E+00	.5195E-02	.2557E+00	0.

UNIT	MFLD	DENSITY	CRSR(MF)	CRSR(M)	F-KILLS	M-KILLS(MF)	MF-KILLS	MOF-KILLS	M-KILLS(M)
10	1	.3242E+00	1.916	0.000	.6412E-02	.3002E+00	.6412E-02	.3130E+00	0.

DISMOUNT EVENT SUMMARIES

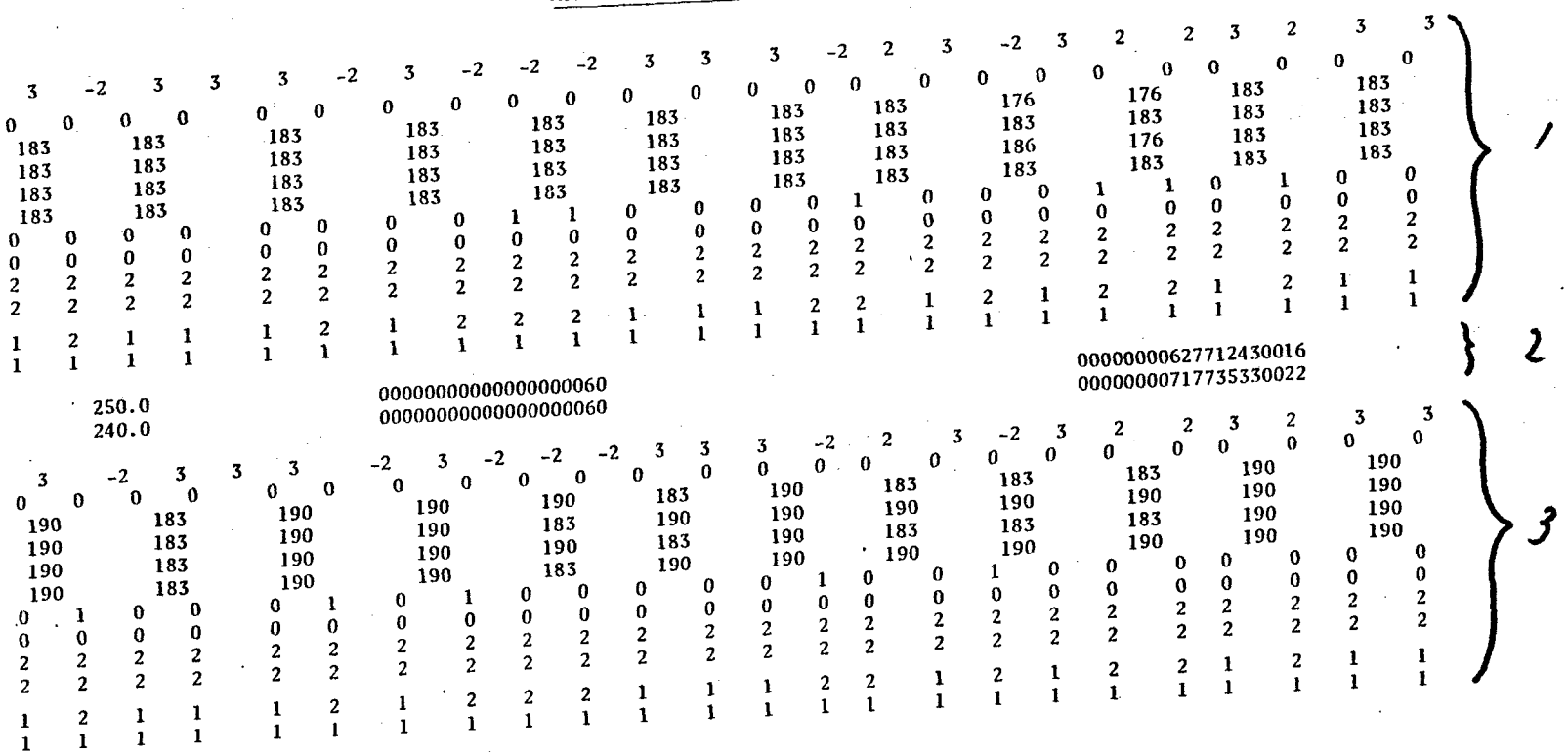
UNIT 18 DISMOUNTED 35.45 MEN INTO UNIT 41

D D D NOW DISMOUNT TROOPS ON AXIS 3

- - - D TROOPS ON AXIS 3 ARE DISMOUNTED - - - JKEYPV = 000000400000

FIGURE 4.1

MOBILITY INFORMATION PRINTS



MINEFIELD INFORMATION

UNIT	MFN	DENSITY	TIME	MCOUNT
2	1	.6938E+00	250.0	1
4	1	.6443E+00	260.0	1
6	1	.6422E+00	250.0	1
8	1	.6457E+00	250.0	1
9	1	.5252E+00	240.0	2
10	1	.6485E+00	240.0	2
14	1	.4505E+00	250.0	1
17	1	.4298E+00	250.0	1

FIGURE 4.2

FORCE-ON-FORCE AND FORCE-ON-SQUAD RANGES

/ / / AVG RG = 1473. FOF/FOS RANGES = 1488.2 1595.4 1336.3 10000.0 10000.0 10000.0

ATTACKER AND DEFENDER PARTICIPANTS SUMMARY

ATTACKER - - - 3.37 NON-PARTICIPATING VEHICLES OUT OF ORIGINAL 36.00 (9.4 PERCENT)
13.86 NON-PARTICIPATING PERSONNEL OUT OF ORIGINAL 206.00 (6.7 PERCENT)

DEFENDER - - - 1.20 NON-PARTICIPATING VEHICLES OUT OF ORIGINAL 9.00 (13.3 PERCENT)
6.57 NON-PARTICIPATING PERSONNEL OUT OF ORIGINAL 90.00 (7.3 PERCENT)

= = = VXR = 2.812 VFR = 4.182 + + +

NON-PARTICIPATING UNIT SUMMARIES

X - X - X - X - X - X - X

SUMMARY OF NON-PARTICIPATING UNITS

NON-PARTICIPATING UNITS - - 145 157 20

FIREPOWER COWARDS UNITS - - 145 157

** NO MOBILITY COWARDS **

ATTACKER COWARDS BY TYPE

TYPE 3312
FIREPOWER .40
MOBILITY .00

X - X - X - X - X - X - X

FIGURE 4.3

UNIT SUMMARY

Statuses of Individual Surviving Units

UNIT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
TYPE	1350	1350	3350	1350	3350	1350	3350	1350	1350	1350	1350	3350	1350	1350	3350	1350	1350
SURV	.90	1.81	.92	.83	.93	.14	.99	1.89	1.94	1.92	2.00	1.96	1.00	1.97	1.00	2.00	1.65
SFULL	.90	1.81	.91	.83	.93	.14	.99	1.89	1.94	1.92	2.00	1.96	1.00	1.97	1.00	2.00	1.65
STUCK	0.00	0.00	.01	0.00	.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SILENT	0.00	0.00	.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.00	0.00	0.00	0.00	0.00	0.00
GRUNTS	0.00	0.00	.98	0.00	.98	0.00	1.00	0.00	0.00	0.00	0.00	.99	0.00	0.00	1.00	0.00	0.00
F SUP	.01	.01	.01	.01	.01	.98	.01	.01	.01	.01	.01	.01	0.00	.01	0.00	0.00	.01
R1LEFT	11.0	22.2	27.6	10.1	27.9	1.6	29.8	23.4	24.4	23.9	25.7	58.8	13.0	25.1	30.0	26.0	20.1
R2LEFT	5.4	10.9	9.2	5.0	9.3	.8	9.9	11.3	11.6	11.5	12.0	19.6	6.0	11.8	10.0	12.0	9.9
R3LEFT	18.0	36.4	3.6	17.1	3.5	2.8	3.9	39.3	40.7	40.2	42.0	7.6	21.0	41.1	4.0	42.0	34.3
R4LEFT	2239.4	4524.5	1838.8	2071.5	1861.2	339.5	1988.0	4724.0	4851.0	4790.3	4996.7	3921.0	2500.0	4929.0	2000.0	5000.0	4135.3
X	3881.0	3880.0	3956.0	3853.0	3942.0	3798.0	3945.0	3818.0	3762.0	3745.0	3851.0	3788.0	3782.0	3771.0	3772.0	3765.0	3753.0
VX	0	-112	0	0	0	0	0	0	0	-39	0	0	0	-76	-108	0	-74

UNIT	18	19	20	21	22	23	24	101	102	103	104	105	108	109	110	111	112
TYPE	3350	1350	1350	3350	1350	3350	3350	1500	1500	1500	1500	1500	7300	7300	7300	7300	8310
SURV	.94	1.83	1.94	1.00	1.97	1.00	1.00	.90	.91	.92	.85	.86	.93	.89	.91	.90	.99
SFULL	.94	1.83	1.94	1.00	1.97	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STUCK	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SILENT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRUNTS	.98	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F SUP	.01	.01	.01	0.00	.01	0.00	0.00	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
R1LEFT	28.2	22.4	24.3	30.0	24.8	30.0	30.0	25.6	25.8	26.2	22.6	22.8	18.1	16.8	17.0	16.6	0.0
R2LEFT	9.4	11.0	11.6	10.0	11.8	10.0	10.0	13.5	13.6	13.8	12.7	12.8	0.0	0.0	0.0	0.0	0.0
R3LEFT	3.8	38.3	40.2	4.0	40.8	4.0	4.0	4.5	4.5	4.6	4.2	4.3	0.0	0.0	0.0	0.0	0.0
R4LEFT	1881.5	4583.9	4846.3	2000.0	4919.1	2000.0	2000.0	5374.8	5404.5	5480.1	5039.6	5093.4	0.0	0.0	0.0	0.0	0.0
X	3747.0	3740.0	3731.0	3882.0	3712.0	3744.0	3788.0	1380.0	1330.0	1140.0	1600.0	1580.0	1140.0	1300.0	1320.0	1460.0	2410.0
VX	0	0	-92	0	0	-90	0	0	0	0	0	0	0	0	0	0	0
SLIME	18	19	20	21	22	23	24	0	0	0	0	0	0	0	0	0	0

UNIT	113	114	115	116	117
TYPE	8310	8310	8310	8310	8310
SURV	.96	.99	.95	.99	.95
F SUP	.01	.01	.01	.01	.01
R1LEFT	0.0	0.0	0.0	0.0	0.0
R2LEFT	0.0	0.0	0.0	0.0	0.0
R3LEFT	0.0	0.0	0.0	0.0	0.0
R4LEFT	0.0	0.0	0.0	0.0	0.0
X	2350.0	2270.0	2230.0	2300.0	2380.0
VX	0	0	0	0	0

FIGURE 4.4

SQUAD SUMMARY

Defending Squads

	2310	9210	9201	5330	9530	5340	9540	5320	9520	9502	5310	9510	9501
112	.99	5.9	415.8	.99	891.0	1.98	1980.1	1.98	67.3	831.6	2.97	5.9	1247.5
113	.96	5.7	401.2	.96	859.7	1.91	1910.4	1.91	65.0	802.4	2.87	5.7	1203.5
114	.99	5.9	415.0	.99	889.2	1.98	1976.0	1.98	67.2	829.9	2.96	5.9	1244.9
115	.95	5.7	400.6	.95	858.5	1.91	1907.8	1.91	64.9	801.3	2.86	5.7	1201.9
116	.99	5.9	415.3	.99	889.8	1.98	1977.4	1.98	67.2	830.5	2.97	5.9	1245.8
117	.95	5.7	400.0	.95	857.2	1.90	1904.8	1.90	64.8	800.0	2.86	5.7	1200.0

AMMUNITION SUMMARY

Ammo Summary by Type

ROUNDS	9101	9102	9103	9107	9701	9151	9152	9153	9157	9351	9352	9353	9357
AMOEXP	13.2	0.0	0.0	0.0	5.4	15.2	0.0	7.3	0.0	0.0	0.0	.9	0.0
AMONA	20.8	11.2	3.7	4424.9	8.7	37.9	18.2	63.2	7578.8	10.1	3.4	1.3	673.7
AMOLEP	115.9	63.8	21.3	25325.1	65.9	284.9	137.8	475.5	57421.2	289.9	96.6	37.8	19326.3

ROUNDS	9660	9210	9201	9510	9501	9520	9502	9530	9540	9550	9560	9570
AMOEXP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AMONA	0.0	1.2	82.8	1.2	248.5	13.4	165.7	177.5	394.5	.5	54.5	45.4
AMOLEP	0.0	34.8	2437.2	34.8	7311.5	394.6	4874.3	5222.5	11605.5	44.5	5345.5	4454.6

FIGURE 4.5

KILLER-VICTIM SCOREBOARD

Defender Victims - Attacker Killers

	1350	3350	5350	5360	5370	OTHR	ARTY	SURV
1500	.38	.04	0.00	0.00	0.00	0.00	.01	4.57
7300	.10	.05	0.00	0.00	0.00	0.00	.13	3.72
8310	.01	0.00	0.00	0.00	0.00	0.00	.14	5.85

Attacker Victims - Defender Killers

	1500	7300	2310	5310	5320	5330	5340	OTHR	MINE	ARTY	SURV
1350	.06	.08	0.00	0.00	0.00	0.00	0.00	0.00	.01	.00	24.12
M	.03	.01	0.00	0.00	0.00	0.00	0.00	0.00	.22	.00	24.12
MF	.67	.79	0.00	0.00	0.00	0.00	0.00	0.00	.01	.01	24.12
MOF	.76	.88	0.00	0.00	0.00	0.00	0.00	0.00	.23	.01	24.12
3350	.01	.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-.00	9.80
M	.02	.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.00	9.78
MF	.13	.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.00	9.78
MAF	.14	.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.00	9.78
EC	.03	.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.00	8.94
EC2	.03	.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.00	8.94
8350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AT TIME 240.0 + + + + + + + + + + + + MACHINE TIME

FIGURE 4.6

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